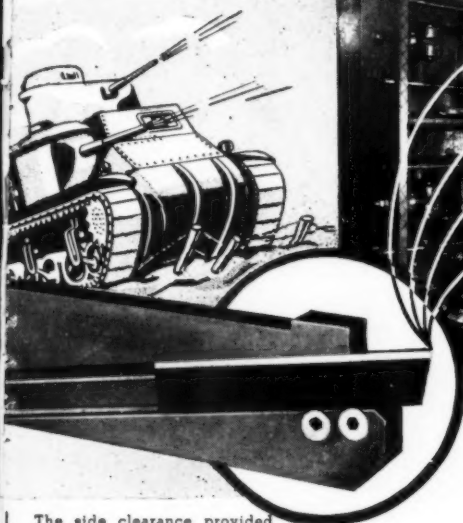


MACHINE TOOL BLUE BOOK

APRIL 1942

DRAFTED



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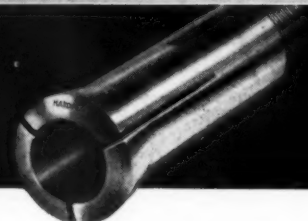
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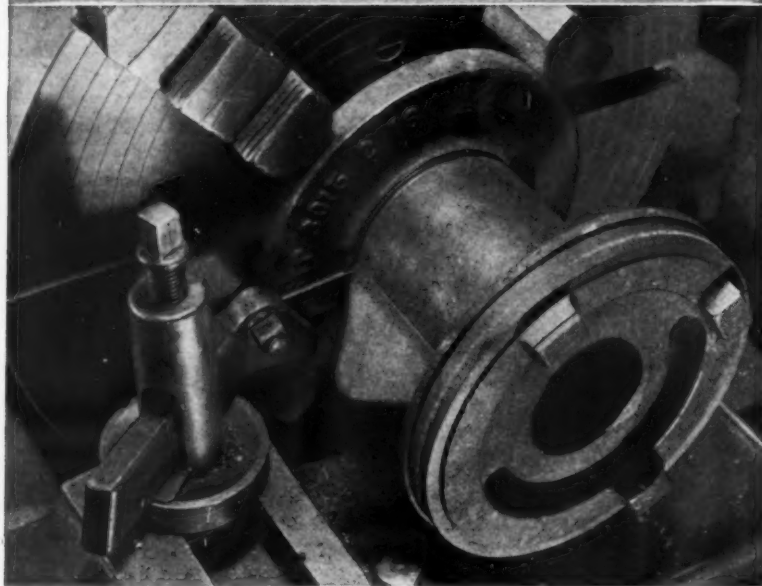
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Machine Tool Blue Book

Hitchcock Publishing Co., 508 So. Dearborn St., Chicago

34,000 This Issue

Volume 38, No. 4

APRIL 1942

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ONE MACHINE • ONE SET UP •
ONE OPERATION



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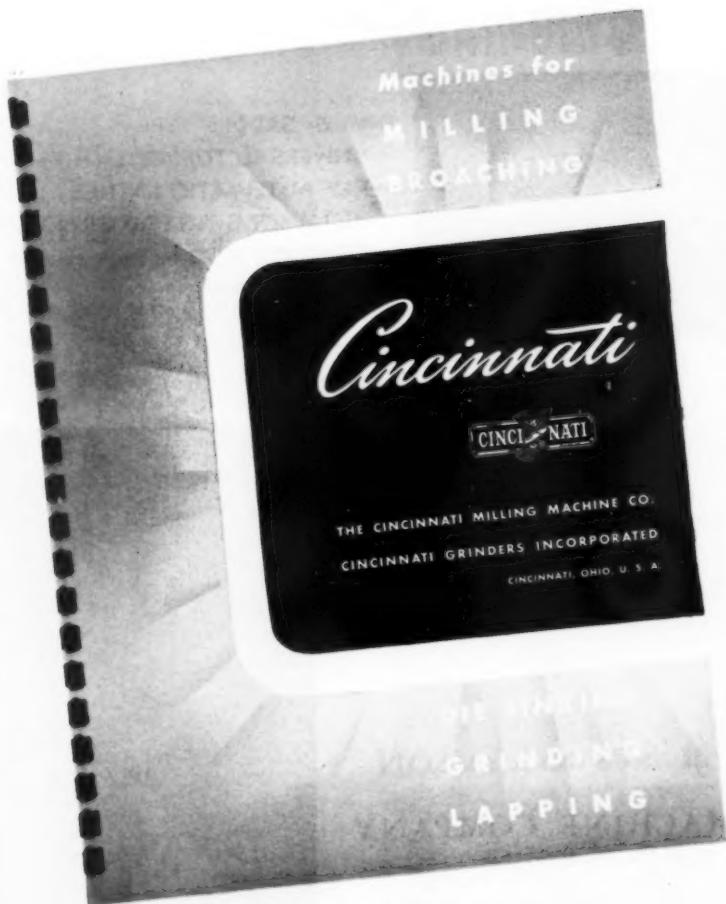


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The Right Type of Machine Tool

FOR MILLING . . . BROACHING . . . DIE SINKING GRINDING . . . LAPPING

THE choice of a machine tool starts with knowing what kind of work can be done on the machine. This basic information is given in an attractive 44-page spiral bound catalog, covering all types of machines bearing the CINCINNATI trade-mark. It also gives you sufficient data on machine features and specifications to definitely fix the size and type of machine for your product.

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GRINDING MACHINES (Model ER)
44-Page Spiral Bound Catalog
Describes Features, Construction, and Operation of this Machine Tool
Also Gives Data on Machine Tool Features, Specifications, and Prices for Hydraulic Grinders, Mills, and
Lathes for Parts requiring Rapid Production.

CINCINNATI



10" PLAIN HYDRAULIC GRINDING MACHINES (Model ER)

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- PRESSURE LUBRICATED TABLE AND CROSS WAYS . . . with 6 automatic pressure lubrication points.
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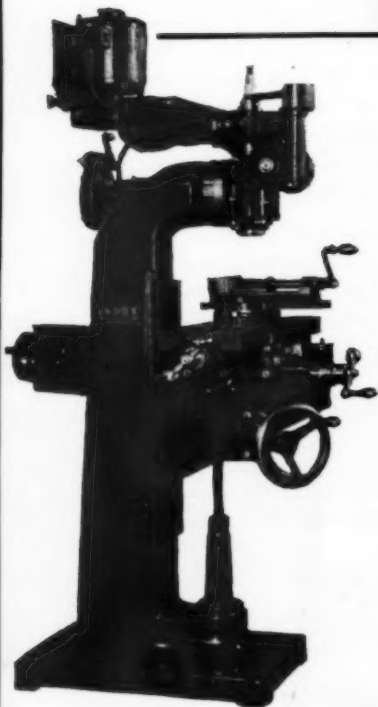
with a rheostat in front of the gears, worm, or chains in the drive, resulting in extremely

The cross feed may be any of three ways, conforming to production requirements:
1. Hand mechanical about
2. Combined with Servo
3. Full automatic lock

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**WOMEN OPERATORS
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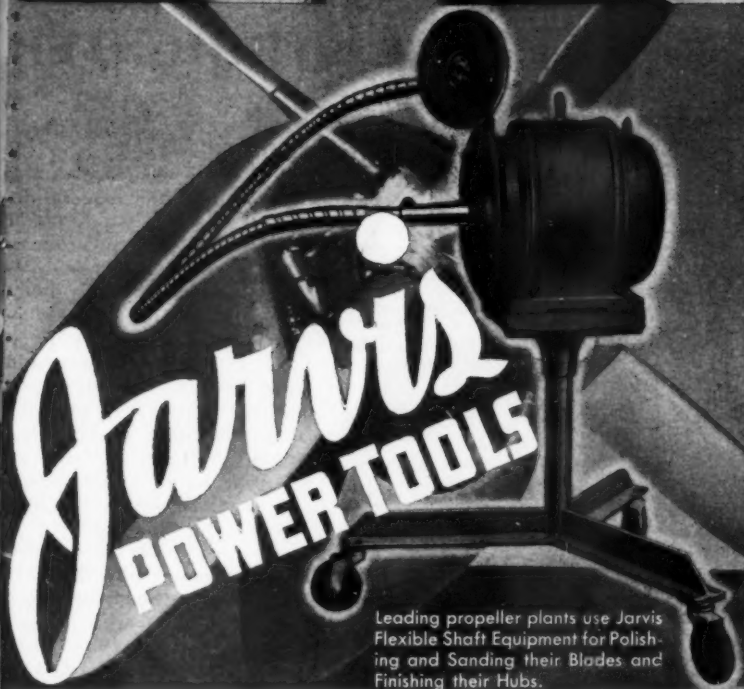
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saw *Easier,*
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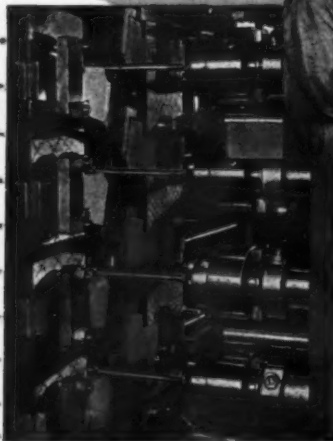
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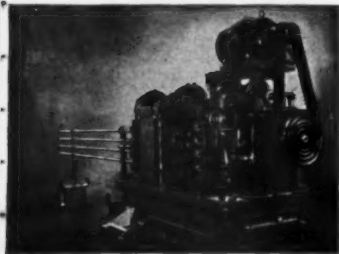
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4 PIECES AT A TIME
from bar stock**



The above is a close-up view of the working area of the 1" CONE Vertical Machine pictured below.



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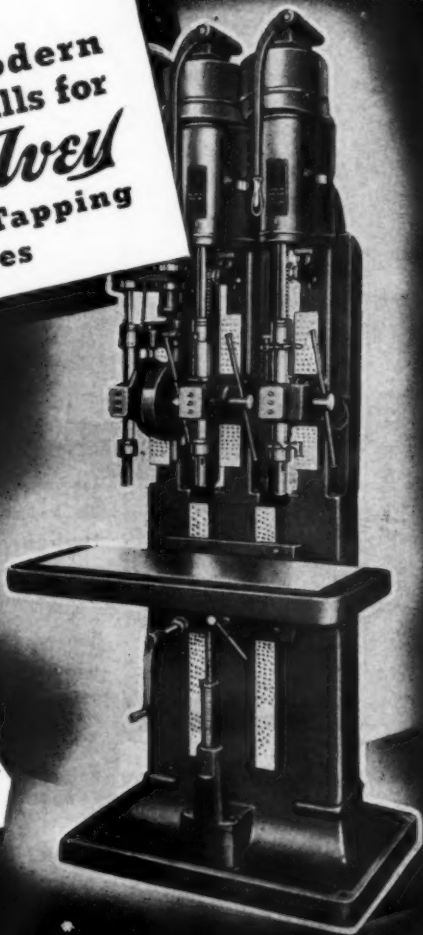
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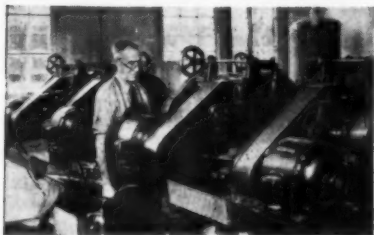
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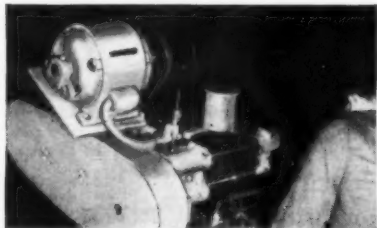
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Drills to the center of circle on base or table

Length of arm

Greatest distance from spindle to base

Minimum distance from spindle to base

Minimum distance from spindle to column

Traverse of spindle

Hole in spindle—Morse Taper

Diameter of spindle at nose

Traverse of head on arm

Traverse of arm on column

Spindle speeds with 1200 RPM motor

Spindle speeds with 1800 RPM motor

Feeds per revolution of spindle

Bearing of arm on column

Size of main driving motor

Height of drill column over gears

Working Surface of Base

Net weight

9" Column
3' Arm

73 1/2"

3'

43 1/2"

9 1/2"

10 1/2"

9 1/2"

No. 4"

2 1/2"

25 1/2"

21 1/2"

(60, 85, 130, 180,

425, 560, 860,

1200 RPM

(85, 130, 180, 274,

560, 860, 1180,

1750 RPM

(.004" .007"

(.010" .020"

14"

2 HP.

89"

25"x45"

4000 lbs.

11" Column
4' Arm

98"

4'

48 1/2"

15"

10"

9 1/2"

No. 4"

2 1/2"

36 1/2"

24"

(60, 85, 130, 180,

425, 560, 860,

1200 RPM

(85, 130, 180, 274,

560, 860, 1180,

1750 RPM

(.004" .007"

(.010" .020"

16"

2 HP.

89"

36"x60"

6200 lbs.

11" Column
5' Arm

120"

5'

48 1/2"

17"

10"

9 1/2"

No. 4"

2 1/2"

45 1/2"

22"

(60, 85, 130, 180,

425, 560, 860,

1200 RPM

(85, 130, 180, 274,

560, 860, 1180,

1750 RPM

(.004" .007"

(.010" .020"

18"

2 HP.

89"

36"x88"

7000 lbs.

on all models

on all models

on all models

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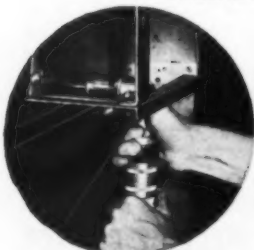
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THE TOMKINS-JOHNSON CO.

605 North Mechanic Street

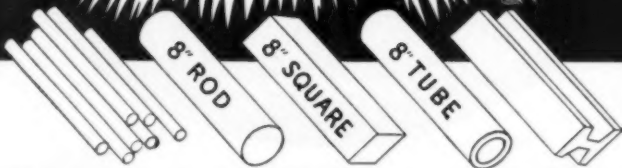
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VERSATILITY *plus*



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1. Welds
2. Heat-treats
3. Controls: Ductility, grain refinement, homogenization. Avoids annealing of hardened surface.
4. Eliminates the human element in selecting weld and heat-treat cycles, etc.

DESIGNED FOR:

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2. Special alloy steels, such as homogeneous and face-hardened armor plate, etc.

HOW IT DOES IT:

1. Temperature AT the weld itself controls weld and heat-treat cycles—*automatically*.
2. Merely set dials for weld and heat-treat temperatures desired. Machine is self-compensating for all such variations as normal differences in metal thickness, induction and short-circuiting losses, presence of scale, etc.

Information on the new process will be furnished at present only to organizations engaged in or contacted to engage in war production work. Please address all inquiries direct to:

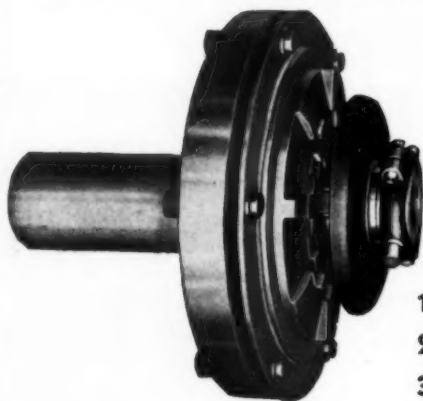


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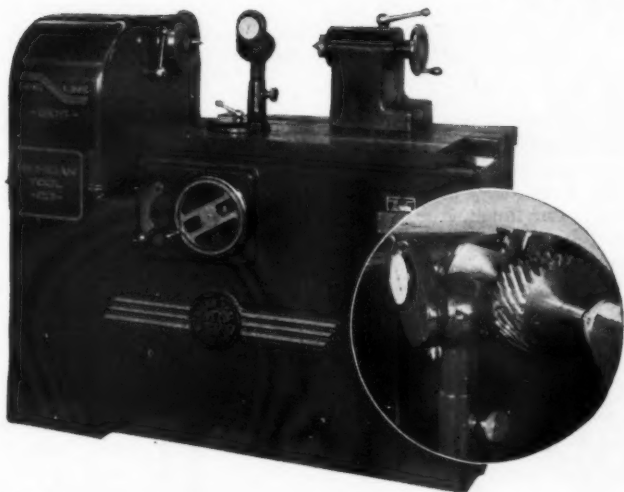
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LEADS from ZERO to INFINITY

- 1** UNIVERSAL—no master rolls or discs or lead screw required.
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- 3** FAST—saves time in setup and checking of gears.
- 4** ACCURATE—Maximum rigidity. Narrow guides and wide ways for sine-bar table.



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Convenient to set up, all adjustments are at 'working' height while sine-bar setting can be checked with either gage blocks or micrometer. The indicator arrangement is

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We will be glad to send you complete information. Ask for Bulletin No. 1205-42.

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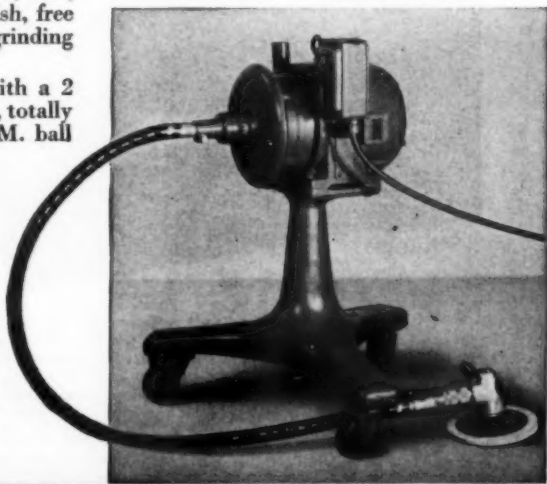
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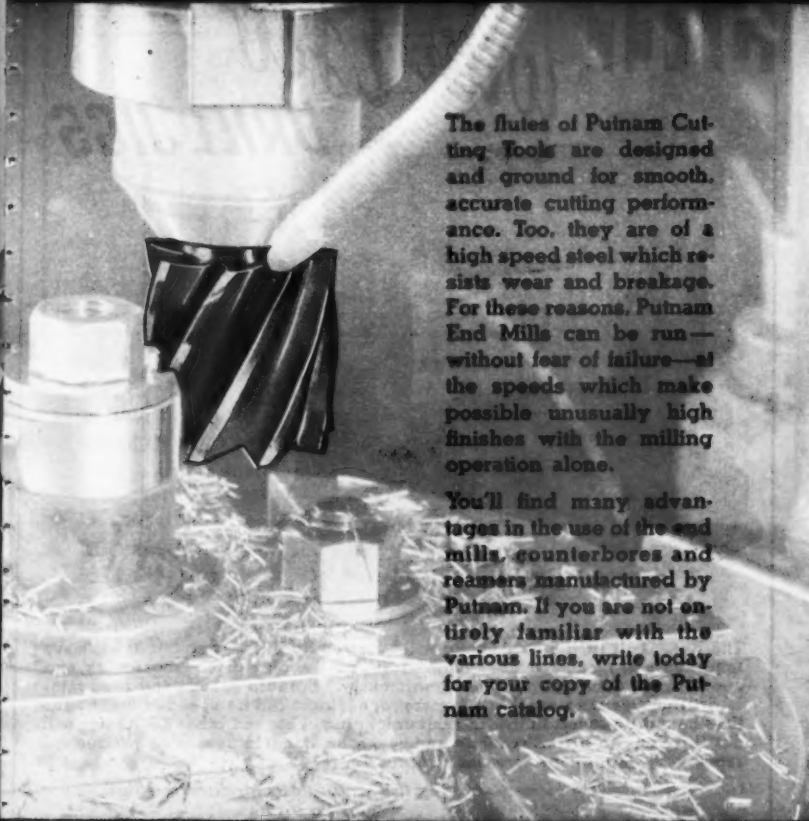
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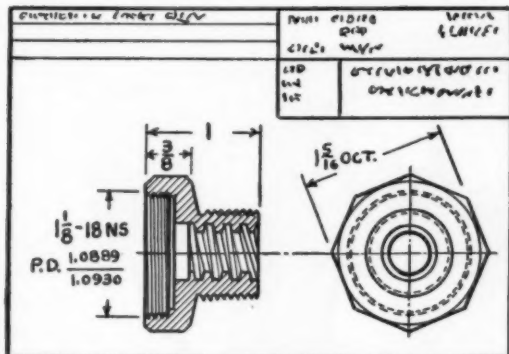
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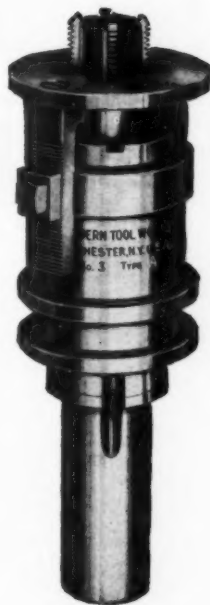
NO SPECIAL CHASERS REQUIRED

for this or any similar job. Standard Chasers are used for thru hole or bottom hole tapping.

The **MODERN** Collapsible Tap will speed up production on your stationary or your revolving spindle machines.

Reasonably prompt delivery.

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Capacity 10" x 18"
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4 Speed
1/2 H.P.
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HERE IS A CAREFULLY ENGINEERED AND STREAMLINED MACHINE. ITS ADAPTABILITY AND FLEXIBILITY IN HANDLING ALL TYPES OF CUTTING IS ALMOST UNBELIEVABLE. THROUGHOUT THE MACHINE ARE FEATURES ANY ENGINEER WILL APPRECIATE. THESE FEATURES ASSURE YOU OF YEARS OF TROUBLE-FREE SERVICE.

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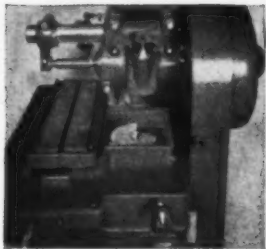




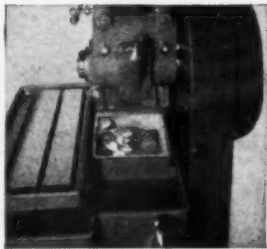
Batter Cutting



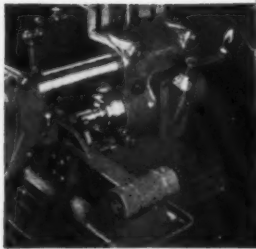
This newly revised Bulletin, just finished, interestingly illustrates all U. S. Multi-Miller features and advantages. Those listed in these pages are described in full detail, and more. Your copy will be sent upon request, with no obligation whatsoever.



U. S. Multi-Millers feature standard cams to provide cycles of fast table approach, cuts at desired speeds, and fast return—all smooth actioned. Special cams for any cycle of special table action. No back lash, ever!



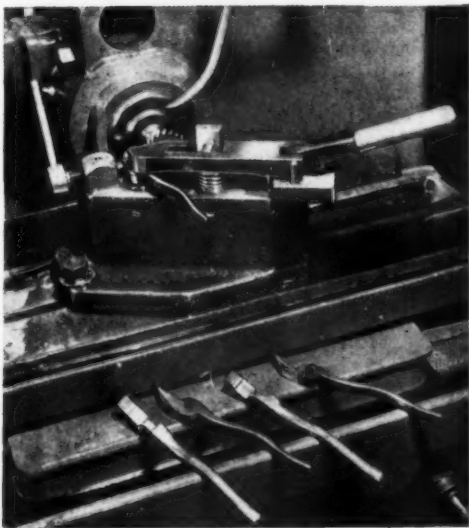
—and for taking cuts on the return stroke of the table, this Double Cam provides absolute control for a desired return feed.



For milling intricate contours. Actual operations photo illustrates advantages possible with this special Hinged Fixture to facilitate fast milling of intricate contours.

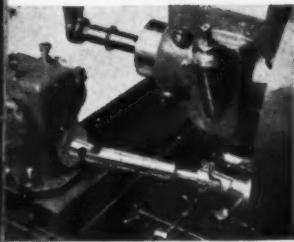
of 4 *Multi* Millers Produces Edges on Pliers

Here is a battery of U. S. Multi-Millers, illustrating the simplicity of set-up and operation for milling drop forged steel with speed—and speed today is a vital factor in fit-out war production! These operations are performed at the H. Boker plant in Maplewood, N. J. The upper right photograph illustrates the first operation on the first Multi-Miller: milling the right hand forging blank to form the cutting edge. The second machine is applied similarly to the left hand forging blank—TIME 29 SECONDS! The lower photograph illustrates the third Multi-Miller milling a cut on the reverse of the right hand forging blank to complete the cutting edge; the fourth machine is applied similarly to the left hand forging—TIME 10 SECONDS! In addition to the speed possibilities illustrated, some of the versatility features of the U. S. Multi-Miller are listed below. Others include—climb milling, rotary milling, index milling, high speed grinding, vertical milling, spur gear cutting, band milling, automatic cut-off, continuous milling of bar and coil stock. Full details in latest bulletin. The U. S. Tool Company, Inc., Ampere, East Orange, New Jersey.



THE U. S.

Multi
MILLER



Horizontal Type Indexing Fixture permits a single operator to handle a battery of these machines. Indexing is fully automatic; drive to fixture is direct from cam shaft.

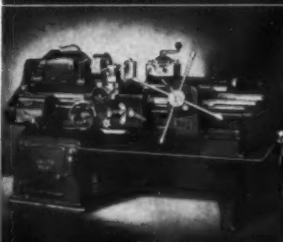
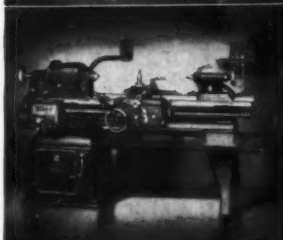
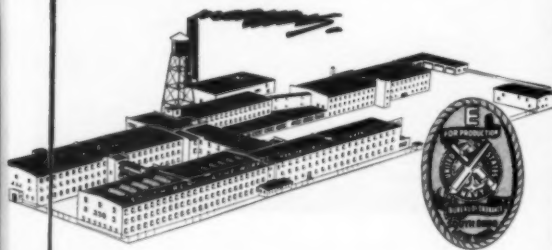


NAVY "E" Awarded to SOUTH BEND LATHE

The Navy Ordinance Flag and "E" Pennant have been awarded to the South Bend Lathe Works for outstanding performance in the production of ordnance matériel for the U. S. Navy.

For years South Bend Lathes have served our Navy. More recently—since Defense demands have called for vastly increased machine tool production—South Bend has been "ahead of schedule" in the production of lathes.

Permission to fly the Navy "E" Pennant and to wear the "E" on our lapels, is an honor. These emblems serve as recognition for work well done—and as a reminder of the tremendous job that lies ahead. We will do our part to help finish it.



SOUTH BEND LATHE WORKS

Editor's Page

FLAMES still flickered over the ruins of Tokyo and Yokohama after the terrible earthquake of 1923. The tremors had ceased. The great tidal waves had receded. Almost a hundred thousand lay dead in the streets or in the embers of their homes.

Nippon was desperate, bewildered, beaten. Survivors of the quake, fire and water seemed destined to perish from starvation or disease.

But they didn't! The American Red Cross saw to that with a stream of ships laden with food, clothing, medical supplies and volunteer workers . . . financed with ten million American dollars. Shortly after the Red Cross received the message:

"Japan will
never forget."

But despite reiterated promises, Japan **did** forget. The sneak attack on Pearl Harbor brought death to Americans even while Japanese emissaries were conferring with Secretary Hull. Japan had hoped to knock out our Pacific bases in the treacherous surprise blow.

On several occasions, General MacArthur and his heroes at Bataan have taken the measure of the Japs in ways they will not soon forget.

American industry is swinging into war production in a way that the Japs cannot forget.

Elevated to supreme command in Australia, it is devoutly hoped that MacArthur and his stout-hearted lads will deal further decisive blows that Japan **will** never forget!

And all of you fellows in American factories . . . don't forget that MacArthur is depending on you!



Wesley G. Paulson

THESE 2 SIZES OF SKILDRIILL ARE A "MUST" IN EVERY DEFENSE PLANT!

Now, more than ever before, you need these two modern SKILDRIILLS to punch holes in every bottleneck . . . to speed your production flow! There's extra power, extra speed, extra ease of handling built into these two compact SKILDRIILLS for precision production drilling, for installation or assembly work in plants building aircraft, tanks and all other defense equipment.

Ask your distributor to demonstrate these SKILDRIILLS on your own work. Once you see how they perform, you won't be without them!

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Capacity $\frac{1}{2}$ in. steel,
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11 $\frac{1}{2}$ in. long, $3\frac{1}{2}$ in.
wide, weighs only 8
lbs. Gets into tightest
places.

SKILDRIILL Model 45
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steel, $\frac{1}{2}$ in. in wood
Only 6 $\frac{1}{2}$ in. long,
weighs only 2 $\frac{1}{2}$ lbs.
Fits the palm of
your hand.

SKILSAW PORTABLE ELECTRIC TOOLS

FOR THE DEFENSE OF AMERICA

Featured In This Issue

GEAR SHAPING and Shaper Cutters is by Charles R. Staub, Chief Engineer, Michigan Tool Co., Detroit. He explains the problems encountered in the production of accurate gears and their solution, with many helpful hints on inspection. Here is a story that should be read carefully and preserved for future reference. See page41

SURFACE GRINDER Development, by Francis A. Westbrook, M. E., (Part II) continues the discussion of this important field and its products. Many additional machines are included with a review of their salient features. Surface grinders are doing many important jobs in connection with war production and Mr. Westbrook's review gives a comprehensive understanding of the available equipment. See page 61

HOW IMPORTANT ARE YOU? That's the subject of Edmund Mottershead's second installment in the series of articles he is writing especially for **THE BLUE BOOK** on **The Human Factors in Morale Building**. Mr. Mottershead is a keen analyst of human nature and his contributions give many valuable hints for the building of better employee-employer relations — a highly important subject now when management is striving for maximum war production. See page87

LIGHT TOOLS are contributing their part to our war production. H. J. Chamberland presents instances in which they are used to advantage, with facts and suggestions. In many instances, bench machines give useful supplementary capacity and relieve the larger machines for larger work. See page105

METAL DUPLICATING Without Dies offers economies and time saving, particularly on small runs. A. T.

O'Neil of the O-Neil-Irwin Company gives many examples of what is being done along this line in the story beginning on page123

HAND FILING is an art that may not be fully appreciated in these days of mass production. Although machines have been refined to an advanced degree, there are many jobs where filing is indispensable. Some of the facts were supplied by Nicholson File Co., Providence, R. I. Carleton Cleveland tells much about filing in the story commencing on page131

SCREW DRIVING can be a bottleneck on the production line if handled by wrist power. Carleton Cleveland describes the use of automatic screw driving equipment in raising output totals, in the story on page.....141

NOISE in the shop imposes strain and stress on sensibilities of workers—especially with the longer shifts and increased working tempo of the times. Ernest W. Fair offers some expedients for reducing and controlling shop noises, on page145

LET'S TALK SHOP presents a new method of calculating Carbide tool performance; some helpful sidelights on grinder performance; a new method of conserving contour saws; suggestions for clamping devices using roller chain; a new kink for moving unwieldy work with special wedges and a method of using short tool bits. Section begins on page151

"TOOLING UP" for Victory is the monthly parade of new tools, new machines and new equipment, beginning on page183

SUB - CONTRACTS — Additional plants with facilities for handling sub-contract work are listed on page...299

Whenever Steel is Needed..

In peace and war, in good times and bad—year-in year-out for a century—Ryerson stocks of steel have been American industry's prompt, dependable source of supply.

Today, war production requirements come first—but Ryerson is serving, too, the needs of other essential industries from which flow the goods that feed, clothe and house the nation,—that supply its power, its minerals and other raw materials—all part and parcel of the mighty war endeavor.



Joseph T. Ryerson
& Son, Inc., Chicago,
Milwaukee, St. Louis,
Cincinnati, Detroit,
Cleveland, Buffalo,
Boston, Philadelphia,
Jersey City.

The two-fold Ryerson function is to supply steel where needed without delay—and to aid in the most effective, intelligent use of that steel in every way that experience and skill can suggest. Wartime demands have made inroads in Ryerson stocks, but Ryerson resources are at your command, to assist you in meeting any problem of steel supply or application.

RYERSON

Gear Shaping and Shaper Cutters

By CHARLES R. STAUB*

THE manufacture of accurate — and therefore quiet—gears by the shaping or “involute generating” process presents a number of problems. Each requires analysis and solution if gears, which can be considered satisfactory for the many precise applications demanded today, are to be produced.

As with any other method of making gears, certain requirements must be met to avoid inaccuracies — hence noise. In general these are:

- (1) The material from which the gears are produced must be properly handled. (Heat treatment, etc.)
- (2) The machines on which the gears are made must be accurate.
- (3) The machine must be properly set up for the particular job.
- (4) The operators must not be careless.
- (5) Cutters must be accurate.

Adequate Checking Equipment

It is important to note that unless the equipment available for checking the accuracy of gears is adequate, it is

*Chief Engineer, Michigan Tool Co.

often difficult and sometimes impossible to locate the cause and to definitely fix the responsibility for any inaccuracy. A checking machine may be quite accurate in its action, but unless it is of a type which can disclose each individual kind of inaccuracy, sepa-

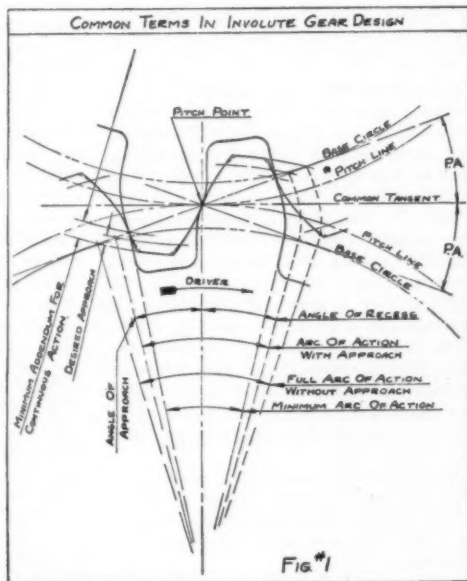


Fig #1

rately and individually, it cannot be considered entirely adequate. Proper checking equipment is often well worth its cost in quickly and exactly locating the cause of gear trouble, and in turn proving whether or not the gears themselves or some other associated element is responsible.

Actually being more intricate than most parts with which they are usually associated, gears must be made and inspected more precisely than other simpler machine parts or components. Careful attention in manufacture, plus adequate inspection will save time and needless expense in obtaining acceptable gears, especially if they are produced in fairly large quantities.

Tooth Form Must Be Correct

Experience has demonstrated many times that the fundamental laws of gearing cannot be deviated from to any appreciable extent if quiet gears are to be obtained.

As it is desirable to transmit power at a constant velocity ratio, gear tooth curves must be such that a normal to the common tangent of the teeth at the point of contact, will always pass through the pitch point. Any deviation from this fundamental law of gear design should always be reason for suspecting the outcome in noise or efficient operation of a set of gears. This is true regardless of the method used to produce them.

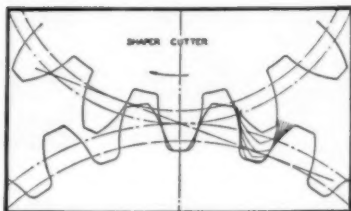
It is generally accepted by prominent gear people that most, if not all gears can be improved when finally formed by the "Crossed-Axis" principle of shaving.

Common Terms in Involute Gear Design

Fig. 1 shows a method of calculating the arc of contact of any two mating gears; also the length of contact of the involute curve with its mating gear.

Generating

The increments of cuts as a gear shaper cutter generates a gear are



sketched above. Note that the gear is generated by successive passes of the cutter through the blank, both cutter and blank rotating at relative speeds which will form the teeth by a series of closely spaced individual cuts. The action differs from hobbing in that with the gear shaper, the cutter is designed to be of involute form, whereas hob teeth are basically of rack form (flat sided) wound in a helix about the hob axis or centerline. In a shaper cutter there is no possibility that a following cut will slightly correct an incorrect preceding pass as may occur with a hob. Each tooth of the shaper cutter forms its complete counterpart in the blank, either once or a number of times according to the relative number of teeth between the cutter and gear blank.

Hobbed and Shaped Gears Will Mate

It may well be brought out at this point that fundamentally, the method used to generate gears, has no bearing upon whether or not they will mate and function properly together. If both gears have the same basic tooth form it is obvious that they must mate properly. And the converse is also true; if they do not mate properly, then they do not have the same basic tooth form. It is because of the latter condition that gears made by the two methods often do not mesh smoothly, and for this reason the impression still exists that they cannot be designed and cut to function together, which is not the case.

It has been the practice in the past, in a few isolated cases, where shaper cutters have been ordered to produce, say 20° P.A., to make the cutters 20° in a plane at right angles to the axis of the cutter, then when the cutter is sharpened with a 5° cutting clearance, which combined with the side clearance will produce, slightly less than 20° P.A. on the gears, thus causing mismatching of P.A. with a hobbed gear of 20° P.A. This can be avoided by making the shaper cutter slightly greater than 20° in the plane at right angle to its axis when it will produce 20° on the gears and consequently interchange with the hobbed gears.

One cause for trouble where gears are manufactured by both the shaping and hobbing processes, is that the established standards vary slightly as to the amount of clearance. For instance, one formula for the depth of cut of the

2.157

teeth is _____ which is gen-

Diametral Pitch,

erally used where all of the gears are finish cut by the hobbing process. When cut by the Shaper method, the

2.250

full depth of cut is _____

Diametral Pitch.

The reason for the greater depth is that sometimes the mating gear is much larger than the generating cutter. To explain this more completely: — the larger the cutter, the more stock it will remove at the fillet and also the larger the gear, the farther the corner of the teeth will sweep into the fillet. However, the hob as compared to the shaper cutter or gear is of definite diameter and cuts out the maximum amount.

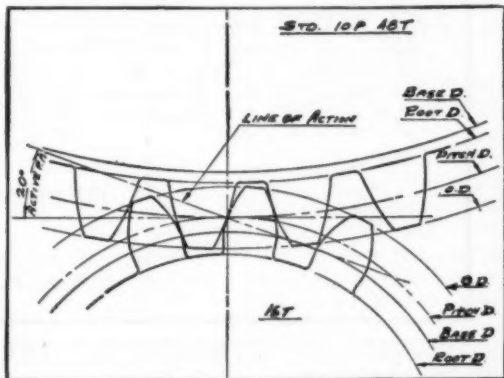
Modified Tooth Forms

The involute gear as it is made today, especially in the automotive field, has a modified involute tooth form comprising "approach curves" as they are sometimes called. In modifying gear teeth it is important not to modify them excessively, since modification of the involute form reduces the amount of involute overlap and therefore the number of teeth in contact.

In the gear shaping process it is possible to modify the shaper cutter to obtain the same results as a modified hob. Certain conditions inherent in the design of the shaper cutter also may have their effect.

To provide the necessary operating clearances and to add strength to the gear teeth, undercutting should be

Fig. 3 — Standard gears that run at standard center distance, cut with standard shaper cutter of 10 pitch, 20° pressure angle.



avoided. Since the base circle, as its name implies, is the base from which the involute form is developed or "unwrapped," the shape of the flanks of the teeth below the base circle is not of involute form. Tip modification is sometimes essential to avoid interference of the tips with the flank of the mating gear near the root of the teeth.

Root Fillets

In developing gear tooth systems wherein gear interchangeability is essential, regardless of the number of teeth, pitch diameter, etc., certain standards have been established for the flank forms and relation of the root diameter to the pitch diameter. The radii of the fillets must be large enough to provide adequate tooth strength and yet not so large as to cause interference with the mating teeth of the mating gear. A gear generated with a shaper cutter will have a larger fillet at the base of the gear tooth than one generated with a hob, providing both

tools are equipped with the same fillet or corner break.

Effect of Re-Sharpening on Form of Shaper Cutter

In order to provide the necessary cutting action, the teeth of a shaper cutter must be completely relieved, i.e. ground with cutting clearance (or hooked) on the face of cutter, also on the outside diameter, and entirely around the tooth form. Thus both the diameter and size of the tooth section are reduced each time the cutter is sharpened. To correct for this reduction in tooth section, the resharpened cutter is advanced (fed) into the blank farther than when new. It is usually taken for granted that adding to the infeed of the cutter has no effect upon the tooth form. This, however, is not basically quite true. When the cutter is fed farther into the blank to obtain the necessary tooth width, its base circle and pitch circle are brought closer to the center of the blank, thus

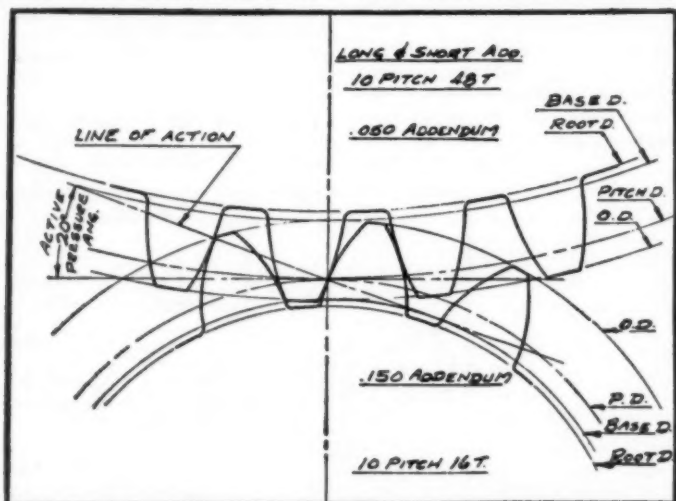


Fig. 4—Long and short addendum gears run at standard center distance, cut with standard shaper cutter 10 pitch, 20° pressure angle. Rolling diameter and active pressure angle do not change.

then I said to myself—



"Welding would bank \$2100 for me here"

What can I learn from this peace-time product to guide me in making plans for the post-war Battle for Business?

ALTER EGO: Well, the first big lesson is that the manufacturer points out that if this \$900 car were built by the non-welding methods of 15 years ago, the cost would run \$3000.

That's a saving of \$2100 by welding and mass production. Could it be possible for me to apply the same method to my product to cut costs and boost volume for the tough years ahead?

ALTER EGO: You know there is a simple plan for changing over to welding, like that of the auto builders:

- (1) Appoint a man of experience and give him authority to supervise welding developments.
- (2) Change over to welding gradually . . . one design at a time.

That sounds familiar. Doesn't The Lincoln Electric Company of Cleveland, Ohio, recommend that plan? Why not write them, state our application and ask for suggestions for changing over?

ALTER EGO: Literally, "one's other self"—the still, small voice that questions, inspires and corrects our conscious action.

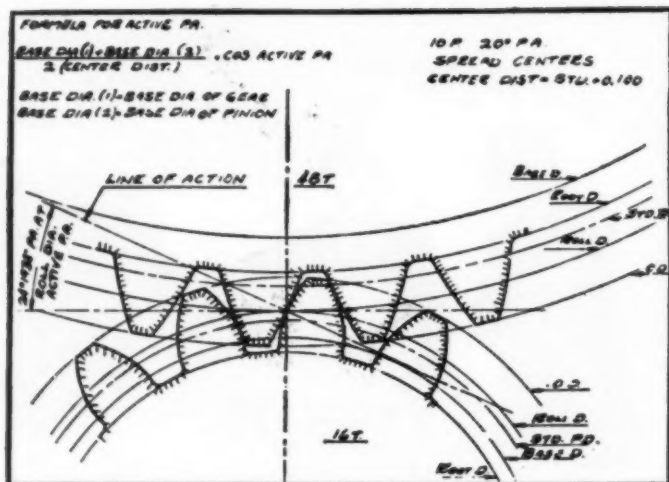


Fig. 5—Standard gears cut with oversize diameters and run at spread center distance of 0.100, cut with a standard 10 pitch, 20° pressure angle shaper cutter. Rolling diameter and pressure active angle are changed.

creating a new operating P.A. at a closer center distance, and the teeth when formed are still quite capable of mating accurately with gears cut by the same cutter, before it was sharpened. Figures 3, 4 and 5 demonstrate this point with the exception that cuts show what happens to a pair of gears. The same thing is also true of a shaper cutter and gear when center distances are changed. Figure 5 shows a spread center but a new operating P.A. is created in either case.

In other words, each time a cutter is resharpened, its base circle is brought successively closer to the center of the gear blank. Since the pressure angle is dependent upon the distance between the base circles of the cutter and gear, it is obvious that if they are closer together, the active pressure angle will be less. And conversely, the farther apart the base circles are, the larger the active pressure angle.

Possible Machine Errors

Inaccuracies in gears due to the machines on which they are shaped are almost entirely the result of wear of the machine itself after a period of use and occasionally are caused by rough or improper handling on the part of the operator or set-up man. Excessive backlash in the gear train between shaper spindle and blank mounting spindle, a bent spindle, bearing wear, etc., sometimes prevent accurate gear generation. In cutting helical gears, the ways guiding the spindle in the helical path may become inaccurate due to long use and thus generate gears with helix errors along the tooth surfaces.

Operating Errors

Although a shaper cutter may be ground to extreme accuracy, with all cutting teeth concentric with the hole, it cannot produce accurate gears if off-center or "cocked" on the spindle. Ob-

POP'S ORIGINAL "SCHOOL OF FILING"

(Every machine-shop should have one)



GREATER production speed and efficiency are desperately needed today. "Get the most out of your machine or tools by understanding them thoroughly," is good advice to the worker.

Files. Superintendents and foremen should be able to pass along helpful information on proper use and care--and especially on selecting *The right file for the job*. It will help pay rich rewards in better results, larger output . . . for war and Victory!

As an aid on filing problems, Nicholson helps include particularly:

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For your file needs, contact your mill-supply house.

NICHOLSON FILE CO., Providence, R.I., U.S.A.
(Also Canadian Plant, Port Hope, Ont.)



NICHOLSON FILES
FOR EVERY PURPOSE



CLASS OF LIMITS	FINISHERS	SEMI-FIN.	ROUGHERS
ERROR IN INVOLUTE FORM	+ .0004 - .0000	+ .0004 - .0001	+ .0006 - .0002
ERROR IN SPACING FROM TOOTH TO TOOTH	.0003	.0004	.0008
ERROR IN SPACING OF TEETH ACCUMULATIVE	.0008	.0014	.0014
ECCENTRICITY OF PITCH LINE, INDICATOR READING OVER BALL IN SPACE	.001	.0012	.002
AMOUNT OF MODIF. AT BASE	+ .0004 - .0000	+ .0006 - .0000	+ .001 - .0000
OUTSIDE DIAMETER	± .020	± .020	± .030
HOLE SIZE	+ .0000 - .0002	+ .0000 - .0002	+ .0000 - .0005
FACE RUNNING TRUE WITH HOLE AT DIAMETER $\frac{1}{4}$ " LARGER THAN HOLE	.0003	.0003	.0003
SHARPENING ANGLE WITHIN	.001	.001	—

The above limits are for shaper cutters of 5 D. P. and coarser and 4 P. D. to 8" P. D.

viously, also, the gear blank must be properly centered.

The remedies for these conditions are quite evident. The shaper cutter must fit the arbor. There should be no noticeable play, otherwise the cutter may shift while cutting.

Utmost Accuracy Required for Shaper Cutters

Due to the fact that each individual tooth of a shaper cutter reproduces its counterpart in the gear, any error in an individual tooth of the cutter will be duplicated in the gear it generates. For this reason great accuracy in mounting the cutter in the generator and in manufacturing the cutters is essential.

When clamping the cutter in position, a minimum of spacing collars should be used. An indicator should be used to check the concentricity of the cutter on the spindle. This indicator should be graduated in ten-thousandths of an inch, since half-thousandths cannot be

relied upon for accurate work. Run-out should not exceed .0005". If the run-out exceeds this amount, it can often be reduced by loosening the clamping nut, rotating the spacing collars and reclamping. It may be necessary to repeat this process a few times before the cutter is accurately located. Accompanying tables give cutter tolerances for various pitches.

Advantages of Gear Shaping

Regardless of any claims for the superiority of one method of gear cutting over another, the shaping process offers certain advantages. Under certain design conditions gears must be shaped. Although some clearance on both sides of a gear is required for overtravel of the cutter, the amount is less than needed for cutting out of a hob or milling cutter. Gears which are integral with closely spaced flanges or shoulders, cluster gears, etc., must be shaped, if the amount of space between the gear and flange or shoulder is limited.



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America's Industrial Man-Power.

KEARNEY & TRECKER CORP., MILWAUKEE, WIS., U.S.A.



Milwaukee **MILLING MACHINES**

Almost all internal gears must be shaped. Parts with internal splines also may have to be shaped if they are to be cut in blind holes, which prevent use of the broaching method. Conditions such as these are especially prevalent in aircraft engine manufacture, where weight and space limitations are important if not actually critical.

Gear Shaping "Versus" Hobbing

As pointed out before, each process of gear manufacture has its definite advantages in various instances. In all fairness to each process, however, and in selecting the process to be used in specified cases, the following information will be of interest:

Prejudice against hobbing as a means of producing accurate gears was largely due in the past to difficulty in making good ground hobs. Irregularities in the teeth were hard to avoid. This is not true today, when hobs of extreme accuracy are available.

It is generally conceded that the "per

minute" cost of making gears by the shaping process is higher than when they are produced by hobbing. This is directly due to the fact that the shaping process is inherently slower, partly because a reciprocating action is used, wherein the cutting action occurs during only a part of the total time, whereas with hobbing the cutting action is continuous.

Checking Gear Shaper Cutters and Shaped Gears

It is advisable to check shaper cutters frequently as an insurance against any misunderstanding with the cutter manufacturer.

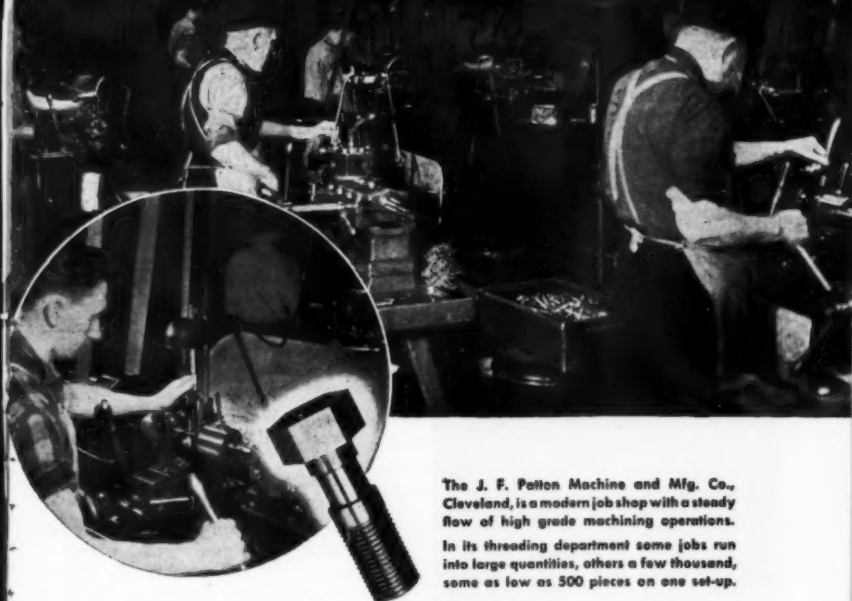
In producing gears, constant control of tooth profile, spacing and lead, (if helical), as well as concentricity is vitally important.

The Michigan "Sine-Line" involute checker is well suited for checking tooth involute profile as well as tooth spacing. This machine is unusually

CLASS OF LIMITS	FINISHERS	SEMI-FIN.	ROUGHERS
ERROR IN INVOLUTE FORM	+0.0002 -0.0000	+0.0003 -0.0000	+0.0004 -0.0000
ERROR IN SPACING FROM TOOTH TO TOOTH	.0002	.0003	.0004
ERROR IN SPACING OF TEETH ACCUMULATIVE	.0005	.0012	.0014
ECCENTRICITY OF PITCH LINE, INDICATOR READING OVER BALL IN SPACE	.0005	.0012	.0014
AMOUNT OF MODIF. AT BASE	+0.0002 -0.0000	+0.0003 -0.0000	+0.0004 -0.0000
OUTSIDE DIAMETER	±.010	±.015	±.020
HOLE SIZE	+0.0000 -0.0002	+0.0000 -0.0002	+0.0000 -0.0005
FACE RUNNING TRUE WITH HOLE AT DIAMETER $\frac{3}{4}$ " LARGER THAN HOLE	.0001	.0001	.0002
SHARPENING ANGLE WITHIN	.0005	.0005	—

The above limits are for shaper cutters of 4 pitch and finer and up to 5" pitch diameter.

AMCO CIRCULAR CHASER DIES "PAY OUT ON SHORT RUNS TOO"



The J. F. Patton Machine and Mfg. Co., Cleveland, is a modern job shop with a steady flow of high grade machining operations.

In its threading department some jobs run into large quantities, others a few thousand, some as low as 500 pieces on one set-up.

Mr. J. F. Patton, President, says, "Namco Circular Chaser Dies pay out on the short runs too."

This Company, like many others, is equipped with a complete range of Namco die heads and carries extra sets of circular chasers in diameters and pitches needed for a wide variety of threading.

By the use of the micrometer gage, they check and regrind the extra chasers in the tool room. One adjustment of the head brings all chasers to exact cutting size.

So, on new set-ups for short runs as well as regrinds for production jobs, circular chasers are ready to go without fussing. Down time is saved and scrap avoided.

And don't forget—circular chasers give 20 times more life than old types—you can grind to 270° of their circumference.

Whether your threading jobs run to millions, thousands or hundreds of pieces of a kind, it will pay you to find out how much time and cost Namco Circular Chaser Dies will save and earn.

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ACME GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND

flexible since it requires no master forms or base circle discs, and the results may easily be charted for record purposes.

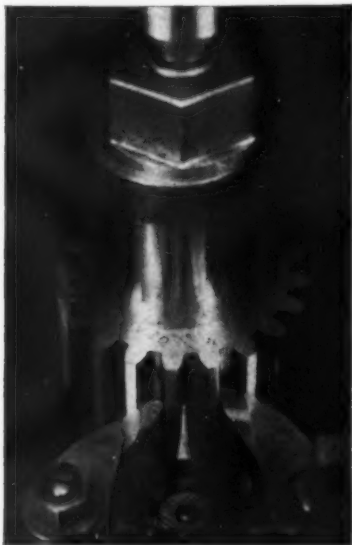
The Michigan Gear Speeder, No. 1127-B is also recommended for testing the quietness of gears and pinions which have been shaped or made by any other process.

The "Sine-Line" lead checker is suitable for checking the lead of helical gears and is also a Universal Machine and does not require or rely on screws or gears, etc.

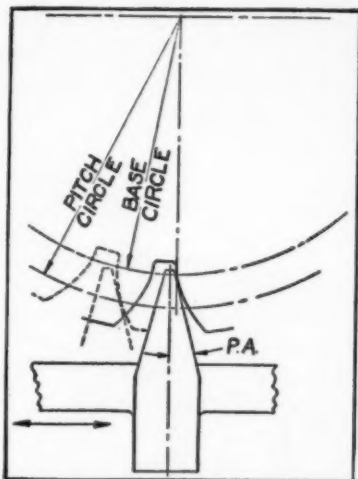
Hints on Cutter Sharpening

Cutters should be kept properly sharpened for two important reasons:

- (1) Economy: — A sharp cutter will cut faster, use less power and last longer.



Tracing fingers of the "Sine-Line" Involute Checker show accuracy of shaper cutter or gear teeth of either spur or helical form.



Master rack tooth eliminates necessity of setting pointer to proper depth in gear or shaper cutter.

- (2) Better Work: — More accurate work will be produced by a sharp cutter. The finish will also be superior to that obtainable from a cutter in dull condition.

A good cutter can be spoiled by not sharpening it properly. A wheel of medium grain and soft grade should be used—yet hard enough to prevent flying grit. The wheel should be kept clean; a glazed wheel may crack the cutter teeth.

Too much metal should not be removed at a time. Too rapid grinding will cause excessive temperature and form check marks in the cutter teeth.

Obviously a shaper cutter should be sharpened on the face only. Even slight "touching up" on any of the tooth sides or ends will alter the correct tooth form and render the cutter incapable of generating correct gears.

In grinding, special care should be exercised not to change the face angle



BOUT of the O'TOOLS

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AIR vs. HIGH-CYCLE
GRINDERS

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So far in this Bout of the O'Tools, HIGH-CYCLE and AIR have taken 2 rounds each:

Round 1—HIGH-CYCLE grinders boosted output 25%, saved \$1695 in first cost.

Round 2—Light-weight AIR grinders improved maneuverability, upped output 10%.

Round 3—HIGH-CYCLE grinders doubled production with 5 less tools, saved 75% in power cost.

Round 4—Light-weight AIR grinders made possible smoother results, cut maintenance costs 15%.

And the fight goes on! In fact, we're staging it daily in scores of plants—analyzing portable tool problems—finding ways to boost output and cut costs with either AIR or HIGH-CYCLE tools.

We'd be glad to tackle your problems in this unbiased manner to give you "all-out" portable tool output.

THE ROTOR ANALYST

"HIGH-CYCLE" Col. 25
Free on request.



"AIR" Col. 27
Free on request.

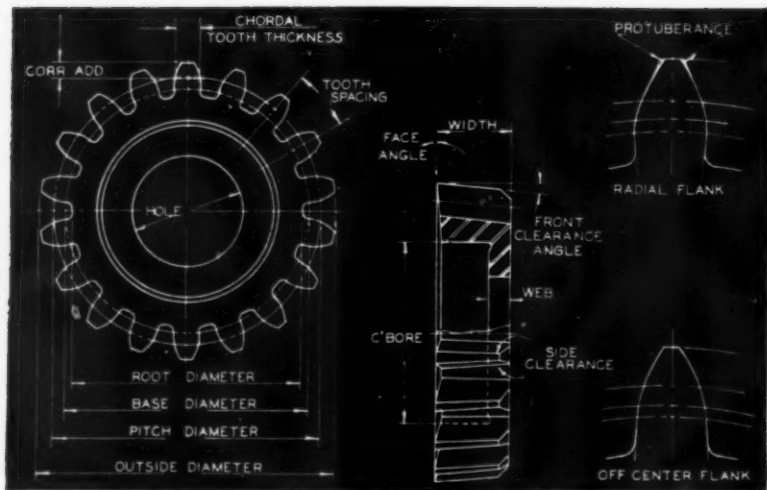
AIR

THE ROTOR TOOL

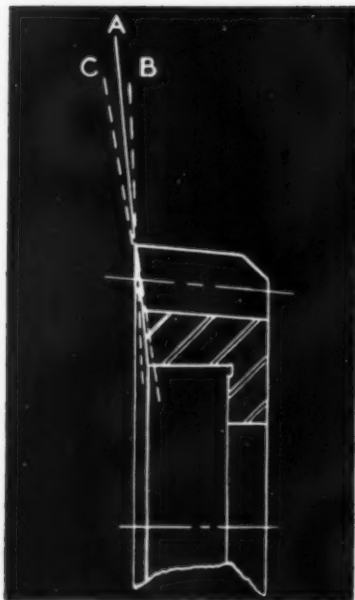
CLEVELAND, OHIO

HIGH
CYCLE

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS



(Above) Nomenclature of Cutter Terms.



of the teeth. The angle has been determined to be the most suitable for the work the cutter is designed to accomplish. In sharpening, the cutting face must be kept true with the bore; if not true it will produce an irregular cutting action, and will change the tooth form.



A correctly sharpened shaper cutter tooth (A) has neither of the common errors shown at (B) and at (C). When a tooth is ground with a decreased angle (B) its cutting qualities will not only become less efficient but it will also change the pressure angle on the work produced. When ground with an increased angle, as at (C), you will increase the cutting efficiency of the cutter but likewise as in the first case at (B) you will also change your pressure angle. As stated, either of these errors will produce an incorrect form and should be carefully avoided.

"KEEP 'EM FLYING"

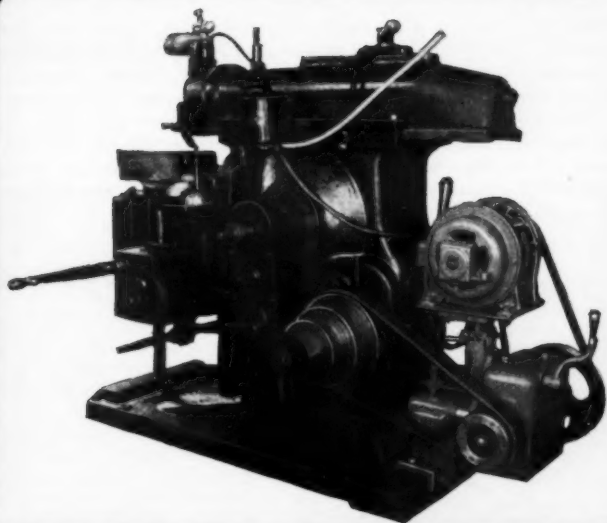
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BERKELEY

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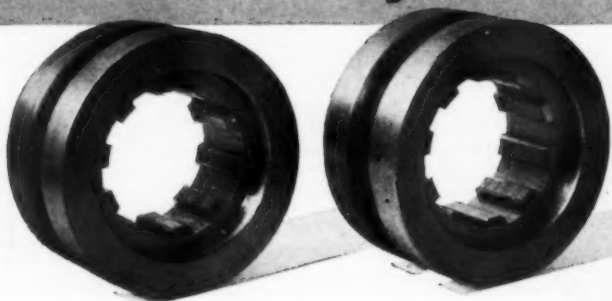
Operating economies will soon repay the initial cost . . . production gains that will increase profits . . . these are the direct results obtained from equipping your machine tools with BERKELEY DRIVES. Absolute accuracy and speed assure maximum production on that special job, under finger tip control. BERKELEY provides a sturdy, dependable drive for every machine tool need, designed and constructed specifically for your requirements by specialists in this field.

WRITE FOR DESCRIPTIVE BULLETINS.



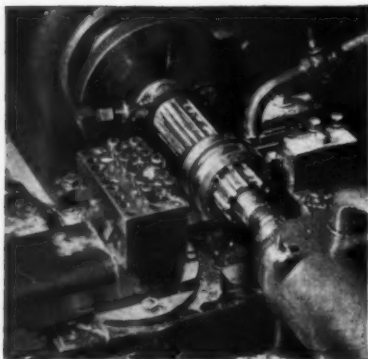
BERKELEY EQUIPMENT CO.
CORRY - PENNSYLVANIA

USE *Ingenuity* TO GET



Illustrated above is a heavy double jawed clutch, before and after being finished on a Monarch lathe, prior to cutting jaws and heat-treating. The operation consists of turning outside diameter, forming groove, straddle facing sides, necking groove diameter and chamfering 4 outside corners.

This job is representative of the thousands of simple parts being machined in large and small lots, where ingenuity in planning will save time and release men and machines for other work. In this plant, it is being done with a single setup on a Monarch 18" Model BB lathe, with double connected rest, tool block in front, and multiple tool block in rear.



How this job is done

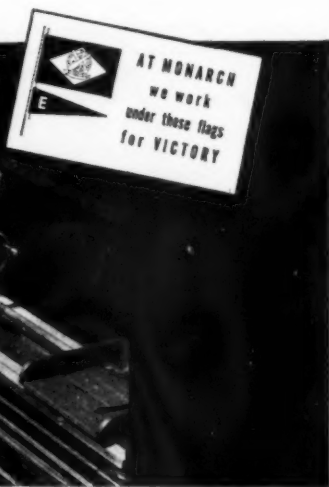
- 1 Press piece on spline arbor and place between centers in lathe.
- 2 Turn diameter, using tool held in rear tool rest.
- 3 Form groove, allowing for grind. The tool is held in the rear rest.
- 4 Straddle face sides, and chamfer, tool being held in front tool rest.
- 5 Neck diameter and sides of groove for grind relief.
- 6 Remove from machine and press of arbor.

Material — SAE-2350 steel. **Tools** — cemented carbide. **Total time** — 8 minutes

MORE WORK FROM MACHINE TOOLS

By using this method, one lathe and operator do the work with a single setup, instead of three separate setups, thus permitting more production from a single lathe.

This illustrates the ability of Monarch lathes to do a wide variety of work, valuable under our present production program. Their design and construction assure accurate performance, high productivity and long life. This is why Monarch lathes carry today's loads without faltering or lost time for maintenance and repairs. THE MONARCH MACHINE TOOL COMPANY, SIDNEY, OHIO.





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If you are a Prime Contractor in need of Sub-Contract capacity, let us know the specific machines you are seeking. We should know something of the product to be manufactured, tolerances required, quantities, deliveries, etc.

We shall do everything we can to locate suitable manufacturing facilities for you, and to bring you in contact with the most promising sources of supply.

Throughout the country are many small plants with skilled workers and suitable machine tool equipment available.

Send a list of your Sub-Contract requirements TODAY!

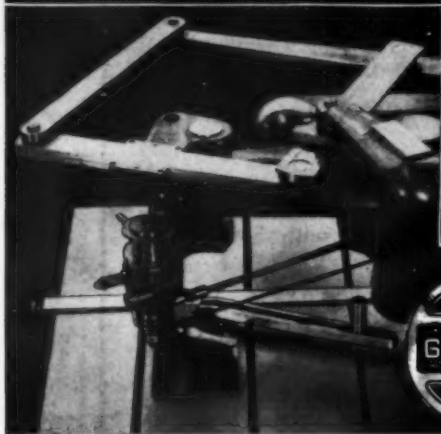
Sub-Contract Dept.,

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Harrison 6040



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Engraving Template

...ON A **GORTON** PANTOGRAPH ENGRAVING MACHINE

ENGRAVING 100 name plates in 12 hours without resharpening the tool, at the Barber-Colman Company, Rockford, Illinois, is a typical example of what can be produced on a Gorton Pantograph Engraver.

The operator is shown engraving a bakelite name plate for a Barber-Colman control unit panel. The name plate is copied from a template (shown above) using a $\frac{1}{16}$ " diameter carbide-tipped cutter. The tracer point is guided by hand around the outline of the template, which is clamped on the copy table.

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SPECIALISTS IN ENGRAVING, DIE MAKING AND SUPER-SPEED VERTICAL MILLING

Highlights in Surface Grinder Development

(In two Parts—Part II)

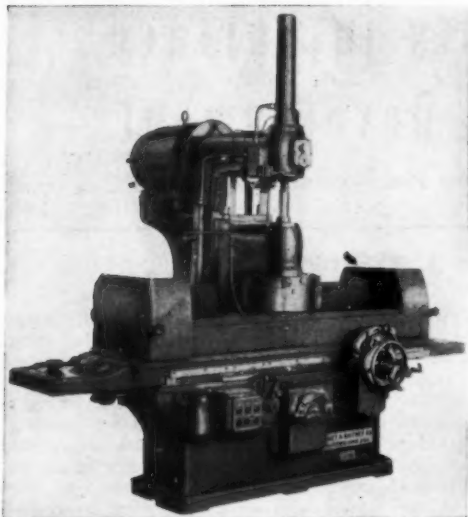
By FRANCIS A. WESTBROOK, M. E.

PRATT & Whitney, West Hartford, Conn., is, of course, another machine tool builder that has been making surface grinders for many years. As noted previously with respect to other machines, versatility for many kinds of work is stressed. This builder feels that the biggest difference between the old and the new is change-over from a gear-driven table to the hydraulic drive. It has made available any speed within its range, and has increased table speeds up to 100 fpm where needed, with the result that

there has been a gain in efficiency and a reduction in grinding wheel costs. The 14" vertical hydraulic surface grinder embodies the latest developments made by this company. Weight has been increased around 20%. Among the jobs done on this machine are the re-surfacing of dies, grinding of plastic moulds made of many pieces, etc. The speed with which the work is accomplished is shown by the fact that one of these grinders with an extra length bed is capable of removing .006" from each side of three steel saws, 5½ ft.



A 14" Pratt & Whitney Vertical Surface Grinder in action.



A full view of the 14" Pratt & Whitney Vertical Surface Grinder which is shown in action on the preceding page.

long in 80 seconds, doing three sides at a time. The total surface finished in this way amounts to 960 sq. ins.

Arter Grinding Machine Co., Worcester, Mass., has been building rotary surface grinders since 1916, at least. These have been a standard product for some 25 years for tool room and light production work, and during that time, they have been progressively developed for meeting modern demands for close tolerances and volume of output. There are, at present, two models. One is available in 8 and 12" sizes and the other in 12 and 16" sizes.

During these years, the general design has been consistently improved. The bed is now rigidly ribbed, thick walled and in a single casting with flat and vee ways for the wheel and dove-tailed vertical ways for the knee. A rigid housing has been provided for the wheel spindle to permit steady movement without vibration. While adjustable bronze bearings are still in

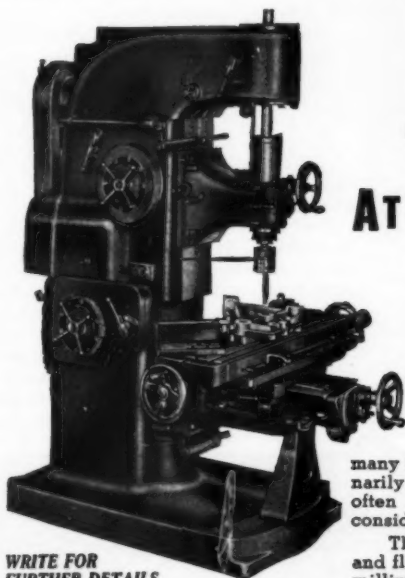
use for the wheel spindle, the design has been improved by the use of chrome molybdenum heat treated steel and better means of lubrication. The work spindle on the present machine is mounted on precision preloaded double row bearings, top and bottom, whereas previously the spindle ran in plain bearings. All machines are now equipped with individual main drive motors, whereas in the old days, were mostly belt-driven, a tight and loose pulley being mounted on the main shaft of the grinder.

Among the applications of these machines are bevels, single or double, on discs or knives, reliefs or concave grinding on saws and gear shaper cutters by tilting the work table, and the grinding of chasers, cutter blades in multiple in tool rooms, grinding long cylinders or work elevated by fixtures, etc. Diameters may be ground accurately by using the side of the wheel with a micrometer stop screw, and

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Our All-Out Victory Program demands 24-hour operation at maximum speed. This means sturdy machines that can stand the production pace, like the No. 40 Knight Miller. It is a universal vertical unit that combines the maximum amount of versatility, rigidity, accuracy and speed without sacrificing any one quality for another. It is designed to perform many operations at one setting which ordinarily would require several set-ups and often more than one machine—important considerations when time is so valuable.

The No. 40 Knight Miller offers ease and flexibility of operation for efficient light milling jobs—accurate and speedy boring operations due to dial indicators—Timken mounted spindles—sturdy, rigid table, etc. It is also capable of heavy milling such as taking $\frac{1}{8}$ " off the 5" faces of steel forgings with a 2" x 6" helical cutter.

W. B. KNIGHT MACHINERY CO.
3924 W. PINE ST. • ST. LOUIS, MISSOURI

many other operations calling for great accuracy may be performed.

Heald Machine Co., Worcester, Mass., makes surface grinders of numerous types to meet the particular conditions of its customers and has also been making standard models for many years, such as the No. 25A. A brief description of some of its features will give an idea of the developments embodied in it. This model is made in two sizes for taking chucks 16" and 24 or 30" in diameter respectively. The bases for both have been carefully proportioned and ribbed with iron, so distributed as to eliminate strains and vibration, making it possible to maintain accuracy and obtain highly satisfactory surface finishes. The wheel slide travels on flat and V ways and is long enough to protect the ways from dirt in all positions of the slide. These ways are lubricated by a pressure system. Good finish is obtained by having the wheel spindle run in a heavy duty ball bearing at the rear and an adjustable bronze bearing in front. The slide drive is an oil hydraulic arrangement.

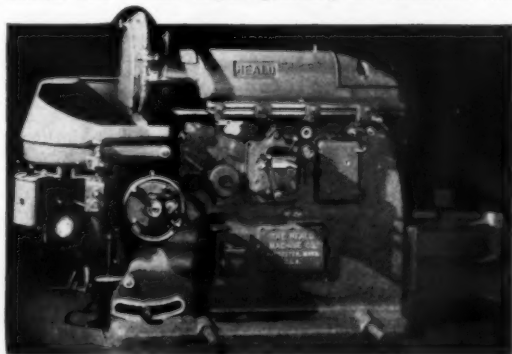
The chuck spindle for the smaller size is supported on a broad flat bearing under the spindle and runs in a precision radial ball bearing at the top, with a straight adjustable bronze bear-

ing at the lower end. The larger size has ball bearings at both ends. The feed to the chuck is by a hand wheel and vertical screw through a nut in the chuck bracket. The hand wheel for elevating the chuck is of the hand compensating type to permit graduation on the hand wheel collar being kept in one relation to the work, to take care of truing of the wheel.

The chuck drive is by means of a d-c motor with push button control which is sufficiently sensitive for edging the chuck into position. The d-c motor with its field rheostat provides for changing speeds.

The main drive shaft at rear of the machine has anti-friction bearings and is directly coupled to its motor. This shaft drives the oil pump through spur gears and the wheel spindle by a 6" endless belt, held at proper tension by a flexible idler. The water pump is also driven from this shaft when wet grinding is in progress.

The Van Norman Machine Tool Co., Springfield, Mass., doubtless due to the great increase of surface grinding for production and other work, started making rotary surface grinders about three years ago and the horizontal type about one year ago. The latter, shown in one of the illustrations, has been designed for various purposes such as for the rapid grinding of distorted and



Front view of a model 25-A Heald Surface Grinder which is made in two sizes.

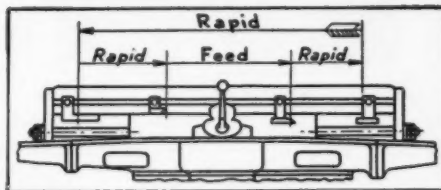
For Milling On Small Arms, Bombs, Fuses, No. 00 Hydraulic Rigidmil Has Everything

Speeds For Everything . . . No. 00 Hydraulic Rigidmil has 128 total spindle speeds, in two ranges: 57 to 2416 r.p.m., and 85 to 3600 r.p.m. Here are speeds for best results on small milling jobs in everything from steel to aluminum or magnesium.

Feeds For Everything . . . Sundstrand Hydraulic Equipment gives you any feed whatever in standard range of $\frac{1}{8}$ " to 37 " a minute, or optional range of $\frac{1}{4}$ " to 65 " a minute. Here are feeds for roughing cuts and fine finishes: for every requirement.

Cycles For Everything . . . Rapid traverse of 400 feet a minute combines with hydraulic feeds in the No. 00 Rigidmil to give continuous or semi-automatic table-cycles for about everything, with climb cutting and conventional milling in various arrangements for maximum production and convenience.

For Example . . . Standard No. 00 Hydraulic Rigidmil shown is climb-milling grooves 0.057 " wide by 0.281 " deep, in brass pieces $1\frac{1}{2}$ " long. Limits, ± 0.002 " on width, half that on depth. Unusual table-cycle, and Sundstrand automatic fixture with loading tray, gives Engineered Production of 1800 pieces an hour. Same machine can be tooled easily for high production on parts for small arms, fuses, bombs, instruments, machine guns, control apparatus, and many other small milling jobs on military materiel or civilian supply.



This unusual continuous automatic table-cycle gives average production of . . .



← Read This Book

For complete information about No. 00 Hydraulic Rigidmil, read book shown at left. A copy will be sent to you promptly on request. Ask for H-00-1.

1800 pieces an hour on these



SUNDSTRAND MACHINE TOOL CO.

2535 FIFTEENTH STREET, ROCKFORD, ILLINOIS, U. S. A.



Here is the Van Norman No. 444 Rotary Surface Grinder.

corroded cylinder heads, manifolds, block tops and various flat surfaces. It may be used for the finishing of cracked cylinder heads which have been repaired by welding, etc. This machine has been simplified so that it does not require a skilled mechanic to operate it. Obviously, it is designed for comparatively light work, as compared with some of the other surface grinders that have been considered. It is provided with micrometer control for the 11" steel-backed wheel and a vacuum attachment to remove dust is mounted directly in the guide rail.

The Van Norman rotary surface grinder is another comparatively small machine designed for the fast and accurate reconditioning of clutch pressure plates of motor cars. Accuracy and the saving of labor are provided for by means of a three-jaw precision chuck, which permits the use of fixtures for aligning plates accurately. Suitable set-ups are provided for different plates, as well as proper feeds and speeds. The spindle has heavy duty ball bearings and all controls are reached from one position.

Another small precision surface grinding machine is now being built

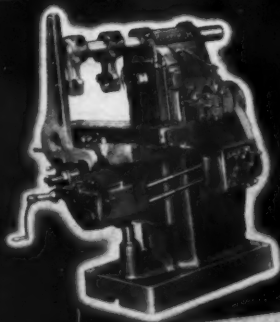
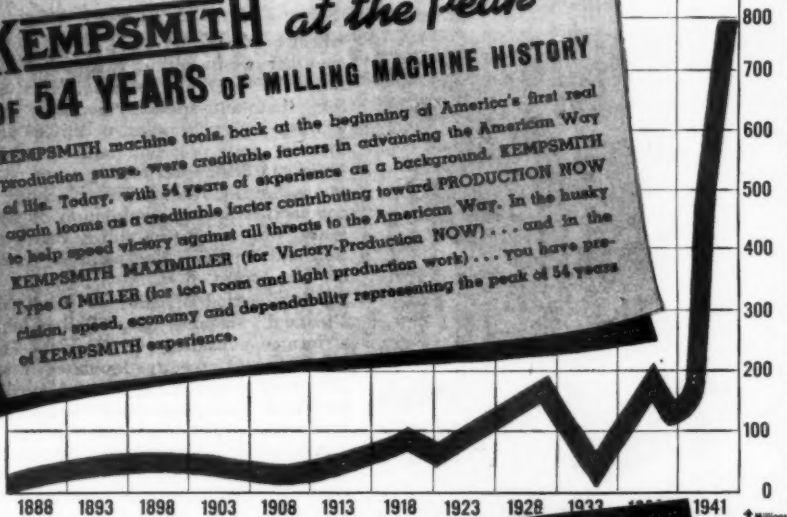
At the right is presented the Van Norman No. 550 Horizontal Surface Grinder.



KEMPSMITH *at the Peak*

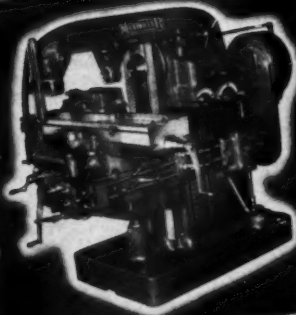
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KEMPSMITH machine tools, back at the beginning of America's first real production surge, were creditable factors in advancing the American Way of life. Today, with 54 years of experience as a background, KEMPSMITH again looms as a creditable factor contributing toward PRODUCTION NOW to help speed victory against all threats to the American Way. In the husky KEMPSMITH MAXIMILLER (for Victory-Production NOW) . . . and in the Type G MILLER (for tool room and light production work) . . . you have precision, speed, economy and dependability representing the peak of 54 years of KEMPSMITH experience.



**KEMPSMITH
TYPE "G" MILLER**

...brother of the famous KEMPSMITH MAXIMILLER



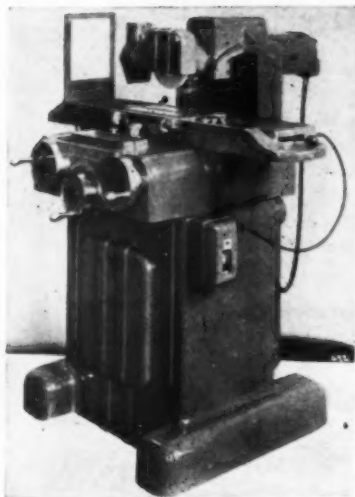
**KEMPSMITH
MAXIMILLER**

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PRECISION
MILLING MACHINERY

Experience SINCE 1888

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MILWAUKEE • WISCONSIN



Taft-Peirce No. 1 Precision Surface Grinder.
by The Taft-Peirce Mfg. Co., which was ordinarily developed for the very accurate grinding of highly finished plane surfaces of gages, tools, etc. The

wheel head may be tilted for angle and shoulder work within extremely close limits of tolerance. The makers assert that anti-friction mounting and bearings minimize wear, permit of uniformity and precision and virtually overcome difficulties arising from variations in oil films. The machine is compact, requiring a minimum of floor space, while featuring sturdy construction and rigidity. The plant is located at Woonsocket, R. I.

For a period of some 40 years, the Diamond Machine Co., Philadelphia, a former subsidiary of Builders Iron Foundry and recently liquidated, manufactured a complete line of surface grinding machinery and associated equipment. This Company offers 30 and 36" sizes (corresponding to diameter of grinding wheel), with centralized controls. Bed has been lengthened so that table never overhangs.

At the present time, Builders Iron Foundry, Providence, R. I., is manufacturing one item in the surface grinder line, an 8x4" capacity utility hand-operated machine. It is of particular interest because of its radical departure from standard designs.



A typical large size model of the Diamond Surface Grinder.

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You need the refinements you get in an UPTON furnace. Little improvements have been added that now mean less costly operation, easier, better working conditions, more uniform work at any production speed. A tub won't do. An UPTON furnace will. UPTON Electric Salt Bath Furnaces are available for most any type of heat treating requiring temperatures from 300° to 2500°F.

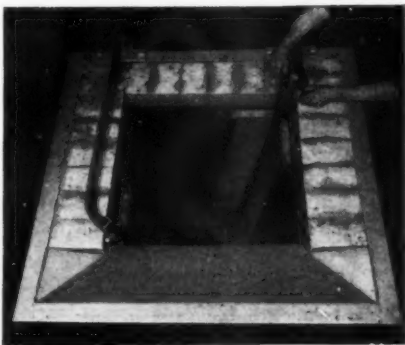
WE ARE MAKING PROMPT SHIPMENTS

Maintenance Costs Cut: These illustrations show improvements that cut maintenance costs, save fuel, increase production speed—reasons why UPTON Furnaces are RE-ORDERED repeatedly by prominent users.

The few insulating bricks required behind the electrodes are held in place by arc welded angle iron braces. Ample space for expansion is provided and bricks are readily removed for replacement by sliding them out at the top.

The single bolt connection with the water cooled bus bar permits changing electrodes in a few minutes time and without hoisting equipment. Keeping the connection cooled insures better current conductivity.

Furnaces for: Carburizing, Neutral Bath Hardening, High Speed and "Moly" Steel Hardening, Aluminum alloy treating, etc. *Please let us have the details of your heat treating problems.*



UPTON ELECTRIC FURNACE DIV. Commerce Pattern Foundry & Machine Co.

We build the furnace using the

ELECTROTHERMIC-PERMEATION

principle of operation

7437 MELVILLE at GREEN

DETROIT, MICH.

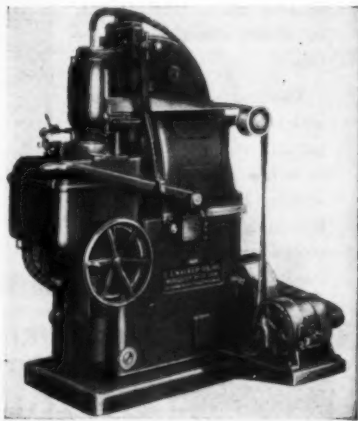


An 6x4" capacity Utility Surface Grinder made by Builders Iron Foundry.

In this machine, the usual intermediate table has been eliminated. Longitudinal and transverse control are accomplished by a "T Square" member. The lever for moving the table longitudinally affords easy, effortless operation and allows operator to control the amount of over-travel very readily, thus facilitating performance. The spindle itself is precision made with a tapered bronze bearing at the front for smooth grinding, and a ball bearing at the rear to contribute to smooth, easy rotation of spindle. The micrometer adjustment for vertical feed is graduated in half-thousandths with well spaced divisions. The spindle is driven by a V-belt transmission from a motor mounted on a pivoted motor base. This machine is used widely for the accurate and speedy grinding of tools, dies, small machine parts, etc.

A single stroke surface grinding machine is made by the O. S. Walker Co., Inc., Worcester, Mass., for the grinding of flat and concave surfaces. The table can be tilted through an arc of 7 degrees. It is possible to grind work having hubs up to 6" diameter, and for saws a clearance is possible at the hub to meet reasonable requirements.

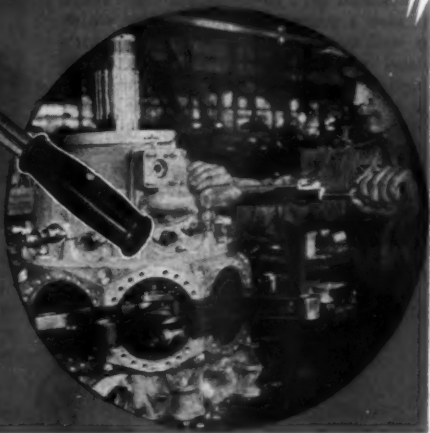
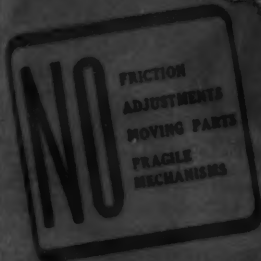
The work to be ground is placed in the chuck and the lowering of the head automatically closes the electric circuit, energizes the chuck and operates a clutch which rotates it. The downward movement is halted by a stop and the wheel head is rigidly secured in place by a locking device. The chuck is adjusted vertically by a hand wheel to produce the desired thickness of work and when grinding is completed and the lock released, raising of the wheel head automatically stops the chuck rotation, breaks the circuit which energizes the chuck and momentarily reverses the current to demagnetize the chuck face and facilitate removal of the work. An index wheel and fixed pointer, as well as a



Model D-B Single Stroke Surface Grinding Machine made by O. S. Walker Co. Note locking device for wheel head.



Torque Wrench



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ADDISON **QUALITY** ILLINOIS

movable pointer adjustable for quick reading, make it possible to duplicate thicknesses accurately and quickly.

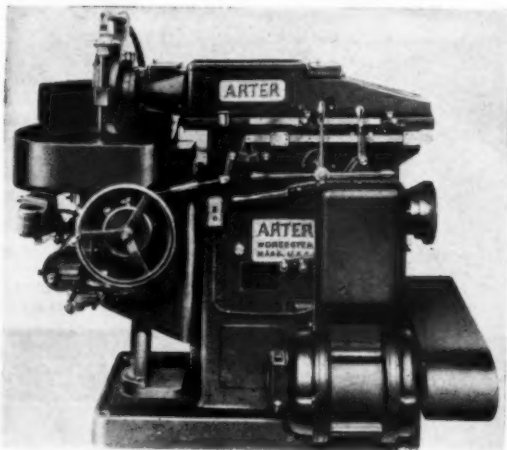
A horizontal surface grinder made by the Robot Machinery Co., Brooklyn, N. Y., designed for small work, shows the trend of modern development. The table may be power or hand-operated, and in the latter case, a device has been provided whereby the transmission gears may be disengaged, reducing the power required for hand operation by about 40%. The ways are lubricated by a pressure system. There is also a patented indicator disc which is well out of the way of the operator's hand while on the hand wheel. By having the indicator point on the disc and not on the wheel, it is felt that efficiency is furthered. Illustration of this machine shows a separate coolant tank, equipped with $\frac{1}{4}$ hp motor and centrifugal pump for delivering coolant through a flexible hose to the wheel and work. Coolant is, of course, returned to the 15 gallon tank.

The Covel Mfg. Co., Benton Harbor, Mich., which purchased the Wilmarth



Robot Surface Grinder with separate coolant tank and dust disposal system.

Model A-3 16" Arter Surface Grinder of present design. Note the older model on a subsequent page.



A FULL LINE OF PUSHERS

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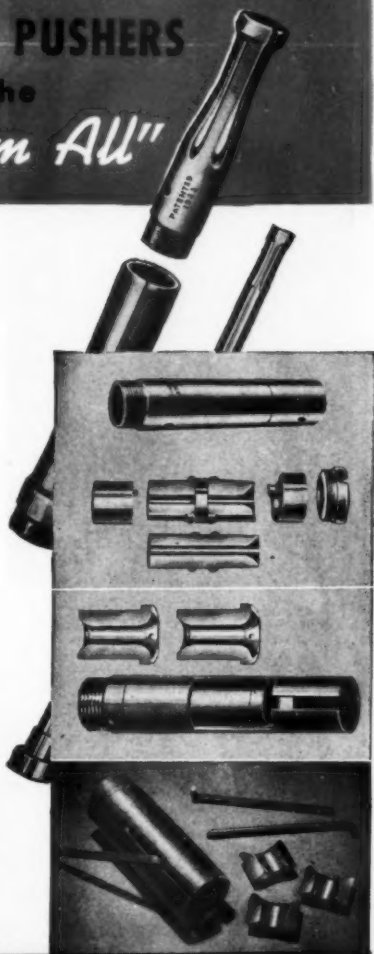
"King Of Them All"

• No other company offers a more complete line of pushers than can be furnished by Modern Collet. For instance, types of master pushers, such as those illustrated, are available to meet every need and preference.

For general purpose use, no pusher is more favorably known than the standard patented type manufactured by Modern Collet. It ranks far ahead in general acceptance of all other pushers now being produced.

Among the features which make standard Modern Pushers so outstanding are these: They are so designed that only one is required for round and hexagon stock and only one is required for round and square stock. They have a long, flat surface grip. They can be tightened, when they become loose through wear, to any desired tension without the aid of special tools. Oversize material can be run with Modern Pushers which take the same list prices as other types of standard pushers. And they are unusually long wearing, for they are made from special analysis steel.

Write for Complete Information



MODERN COLLET and MACHINE CO.

403 Salliotte Street

Ecorse, Michigan



Enthusiastic shop force puts the first of the new No. 2-B Reid Surface Grinders through its paces.

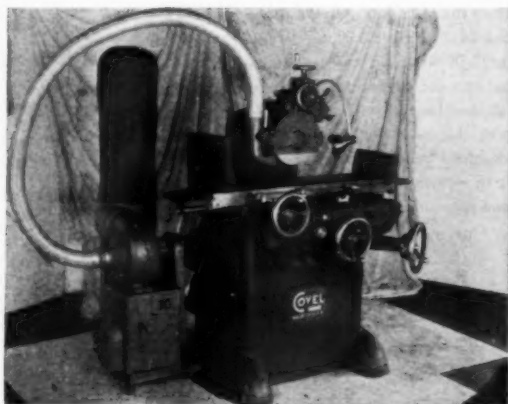
& Morman Co. in 1927 has been developing their line of surface grinders ever since. Comparison between specifications of the old and the latest types of grinders shows various interesting differences, more or less typical of the general changes in design that have taken place. For instance, the latest model is provided with hydraulic drive and individual motors. The old units had pulleys for drive from overhead shafting. Here are some other comparisons which are probably typical of general trends, if not in full details.

	1920	1941
Weight, lbs.	2015	3800
Drives	belt	motors
Grinding wheels	10"x1"	12"x¾"
Table speed ....	.....	10 to 90 f.p.m.

Exhaust dust collecting attachment and 3 spindle speeds. Of course there are other differences, but space hardly permits of including more details.

The Reid Bros. Co., Inc., Beverly, Mass. has developed an all-electric tool room surface grinder, 6x18" size. This new machine operates the longitudinal and cross feed with a ¼ hp reversible motor which eliminates a great many mechanical parts, including gears which, in the past, sometimes introduced annoying vibration and chatter. The table is operated by a silent chain

A recent model Covel Surface Grinder featuring hydraulic drive, individual motors, 3 spindle speeds, exhaust collecting system, etc.



Boring operation
on propeller for
Navy—a typical
job for MO-MAX.

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Molybdenum	8.50
TUNGSTEN	1.50
Chromium	4.00
Vanadium	1.00

Standard with fourteen of
the leading steel mills.

MO-MAX High Speed Steel was developed after the last war in order that America would never again suffer lack of high speed steel due to shortage of tungsten.

The shortage of tungsten is again with us, but now America's high speed steel needs are fully protected since **MO-MAX** is:—

1. An all-purpose steel

It has demonstrated its usefulness for all purposes for which high speed steels have been used.

2. A generally available steel

It is being manufactured and made available to industry generally by 14 high speed steel manufacturers.

3. A proven steel

MO-MAX has had nine years of experience in virtually every field upon which it will be called to serve in the present emergency.

4. A steel of superior performance

MO-MAX made its place in the tool steel industry in peace times by displacing the proven steels of yesterday, and it has done this on its superiority of performance.

5. The true Strategic Steel,

because it uses a minimum of tungsten with no increase in vanadium.

For booklet containing technical data, write
The Cleveland Twist Drill Co., Cleveland, Ohio.

"LMW" Alleghany Ludlum Steel Co.

"Mohican" Atlas Steels, Ltd.

"Bethlehem HM" Bethlehem Steel Company

"Mo-Cut" Braeburn Alloy Steel Corp.

"Star Max" Carpenter Steel Co.

"Molite B"

"Rex-T-Mo"

"Di-Mol"

"Rex-T-Mo"

"Mogul"

Columbia Tool Steel Company

Crucible Steel Co. of America

Henry Duxton & Sons, Inc.

Halcomb Steel Co.

Jessop Steel Company

"Taimo"

"S.T.M."

"Mo-Tung"

"Vul-Mo"

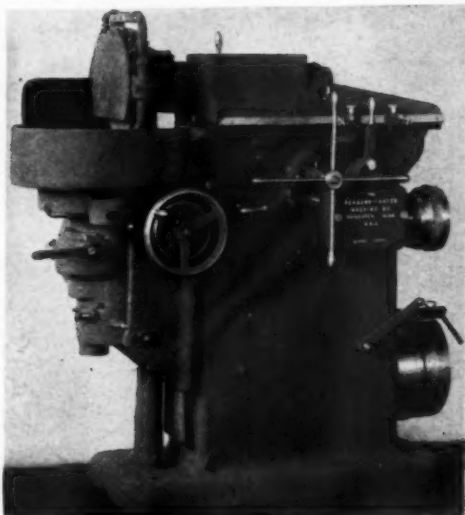
Larrobe Electric Steel Co.

Simonds Saw and Steel Co.

Universal-Cyclops Steel Corp.

Vulcan Crucible Steel Co.

Contrast this older model Arter Surface Grinder with the latest type shown on a preceding page.



instead of rack and pinion, its speed being 20 ft. per minute. All shafts have ball, roller or Oilite bearings.

All castings are normalized and both cross-slide and table are equipped with oil-rollers for proper lubrication and consequently longer life. To this end, the whole machine also has been fully protected against abrasive dust.

This machine may be operated with hand or power feed, without loss of time. A switch conveniently located on front permits operating the spindle alone, eliminating motor for the power feed. By throwing switch in the opposite direction both spindle and feeds are power operated. Safety switches prevent jamming the machine in any way. The cross-feed is equipped with an automatic kick-off when power feed is employed.

The 2-B machine can be equipped with five different types of spindles, namely, the Reid regular spindle, Pope, SKF roller bearings, or the choice of

three different motorized spindles. When belt-driven spindles are used, a 1 hp motor is required in the base. H. Leach Machinery Co., Providence, R. I. is exclusive selling agent for the Reid surface grinders.

The Hill Acme Co., Cleveland, O., makes horizontal and vertical surface grinders in number of table sizes of 18, 24 and 30" width and from 5 to 20 feet long. As will be seen from the illustration, these grinders are capable of handling large work with precision. They are of the open side type, with built-in motors, hydraulic drive for the table and cross feed with a dual pump system to provide independent operation of the two and permitting power redressing of the wheel. The bed, table and column are of alloy sturdy castings designed for permanent accuracy so that working to tolerances of .0005" is common daily practice. Spindle drives are direct by means of built-in balanced motors and the hydraulic drive provides for infinitely

For Faster Production

ON A VARIETY OF MOLDING, PRESSING, AND PUNCHING OPERATIONS

This compact air operated platen press provides rapid operation and flexibility that allows it to be used for a variety of different types of work involving the application of pressure. Available in two sizes—15 ton and 50 ton capacity—this press is air operated and is compact and comparatively light in weight. The air supply at 80 to 100 lbs. pressure is already available in most plants.

Many industrial plants are using multiple unit installations of these presses for convenient, rapid handling of pressing, molding or forming operations, and for increased production capacity without excessive investment. One operator efficiently handles as many as five presses on many types of work.

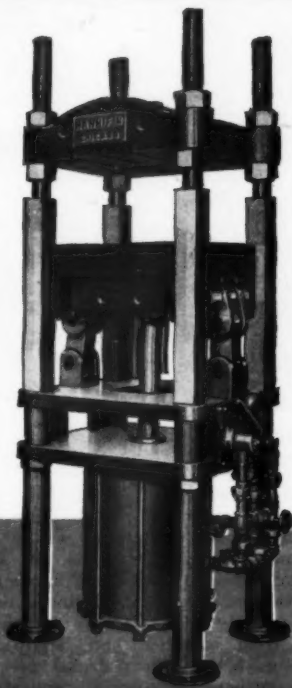
The exclusive design of this air operated press provides a fast operating cycle that saves time on production operations. The rapid advance stroke is followed by a short power stroke at full pressure, and full power is available on the return stroke, to open molds. Speeds in either direction may be regulated to suit individual needs. These platen presses are being used for a variety of work, including steel rule punching or blanking, multiple pressing operations, rubber and plastic molding, perforating, and forming. Hannifin engineers will gladly give you specific recommendations on the application of this equipment to your work.

PROMPT DELIVERY

A limited number of both 15 ton and 50 ton presses of this type are available for immediate shipment.

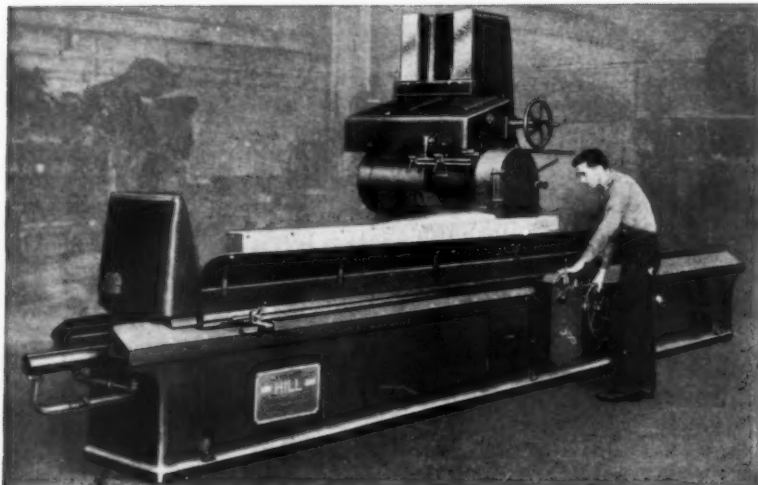
HANNIFIN MANUFACTURING CO.

621-631 South Kolmar Avenue
Chicago, Illinois



SPECIFICATIONS

Model L-207: Capacity 50 tons at 80 lbs. line pressure. Between columns, 22 in. Daylight, minimum platen down $17\frac{1}{2}$ in., platen up $9\frac{1}{2}$ in. Advance speed six to eight times pressing speed. Cushioned reversal at full power. Adjustable speed control in each direction. Also Model L-200, 15 ton capacity; and Model L-200, 15 ton bench press.



An 18x120" Open-Side Hill Horizontal Spindle (built-in-motor) Surface Grinder.

variable table speeds up to 100 ft. per minute.

The vertical type machine is so designed that the head may be tilted for grinding concave surfaces within the maximum periphery of the 26" segmental wheel. With both horizontal and vertical types, construction is massive for sustained accuracy and freedom from vibration and large slide bearings have been provided for the same purpose. Successful applications of these grinders include machine tool beds, hardened steel ways, die blocks, forgings, stamping dies, locomotive guide bars, cams, etc.

The Foote-Burt Machine Co., Cleveland, makes a Hammond No. 2 Hand Feed Surface Grinder. It is a precision tool room machine for accurate work.

Spindle is direct motor driven, mounted on precision pre-loaded ball bearings. The spindle carrier is mount-

ed on double dovetails with adjustable tapered gibs. Any one of three spindles assemblies, the Hammond, Ex-Cell-O or Parker, is available. The hand wheel for raising and lowering spindle is graduated in half-thousandths. Total vertical adjustment is 10 $\frac{3}{4}$ ". Automatic take-up on the spindle elevating mechanism compensates for wear on the screw or on the nut. The spindle is arranged to take 7" diameter by $\frac{1}{2}$ " thick grinding wheel with 1 $\frac{1}{4}$ " hole.

Table has a working surface of 6"x 18" and is provided with tee slots for holding the work. In and out movement of 6 $\frac{1}{2}$ " of the table is by means of a cross feed hand wheel graduated in thousandths. Cross feed screw is mounted on ball bearings. Longitudinal travel of table is 18".

Lubrication is by a one-shot pressure system that forces lubricant to all moving parts except spindle proper. Dust guards are provided.



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this book..*

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The 30 page Bryant Series 5 Internal Grinder Catalog is profusely illustrated with photographs and line drawings that show how these machines can save time and money in the tool room and on production work. Many pages are devoted to instructions for set-up and operation which will prove of particular value to those already using Bryant Series 5 Grinders. One section shows chucks and holding fixtures for many types of jobs; another section shows the Bryant line of standard wheel heads.

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DoAlls range in price from \$1,000 to \$5,000 complete with necessary equipment, yet are relieving \$10,000 to \$50,000 machine tools of overload work with valuable savings of time and metal.



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the same time.
A single ski has
24 separate cuts.
Formerly cutting
was done, one
at a time with
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method of
resawing metal

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And—when the war is over, the DoAll won't have to be scrapped, but can be put to immediate work on your shelved peace-time orders, without changing a single nut or bolt.

Let us send a factory trained man to show you just what the DoAll can do for you now and later.

AGITATOR MOLD

At Emmett Mold, Inc., this Washing Machine Agitator Mold was made in 13½ hours on the DoAll. Material is Chromo-Vanadium Steel 10" thick, 18" diam. weighing 720 pounds.



HAMMER DIE

At American Fork & Hoe Co., this 10" thick Hardten Tool Steel Forging Die to make hammers was cut on the DoAll. Saving was about 60% in time and a great amount of metal, over any other method.

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At Char-Gale Mfg. Co., 50 parts are cut at a time from 30-gauge galvanized iron. Operator can cut 1000 or more parts a day, which is 3 to 4 times faster than the old method, one at a time with hand tin snips—and a much neater job.



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Send for interesting and helpful book "DoAll in Production"





Hammond No. 2 Hand Feed Surface Grinder made by The Foote-Burt Machine Co.

Magnetic chucks of various types and sizes are used on many surface grinders. A decidedly helpful development within the last few years has been an automatic chuck control which facilitates removal of the work. Known as Neu-T-Rol and made by Electro-Matic Products Co., Chicago, this automatic control automatically demagnetizes the chuck and the work piece sufficiently to make removal of the work an easy job.

The device gives control of the voltage in the windings of the chuck. As the makers explain it, with ordinary methods of control, voltage in the chuck windings at the instant the circuit is opened may equal many times the normal voltage impressed on the windings. Since this induced voltage is of the opposite polarity to the previously impressed voltage, the magnetic fields set up in the chuck cannot be dispelled by applying a reverse normal line voltage.

With Neu-T-Rol the induced voltage is under control and never exceeds the line voltage. Hence no eddy currents are set up in the chuck and the work piece leaves the chuck the same as when it was first placed there before the current was turned on. Arcing at contacts is suppressed and the chuck is protected against voltage surges. Moreover, the work is quite completely demagnetized—so much so that in most cases further demagnetization is unnecessary.

The device is particularly useful in handling light pieces which might be distorted or warped if full magnetization of the chuck were used. With Neu-T-Rol any desired amount of residual magnetism can be retained. When the grinding is completed, the chuck is fully demagnetized and the work piece easily lifted off without any bending or distorting.



Neu-T-Rol Magnetic Chuck Control for quick release and demagnetizing of work pieces.

The Neu-T-Rol equipment is compact and can be built into new grinders by the grinder manufacturers when specified, or easily installed on grinders already in use. A remote control switch fits in the grinder control panel.

"KEEP 'EM FLYING"
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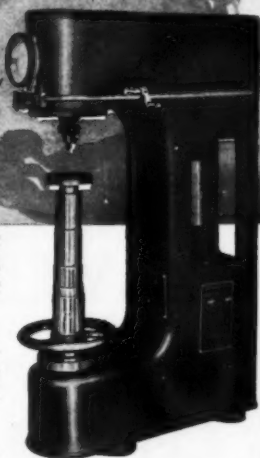


This tester has been calibrated on the major load of 150 kg which consists of three calibrated weights (60 kg, 40 kg and 50 kg) and on a minor load of 10 kg.

The Clark Hardness Tester has but THREE adjustments—1. For either increasing or decreasing the minor load. 2.—Gap adjusting screw. 3.—Indicator Holder.

The main beam on the tester is controlled by the use of a dash pot which also has an adjustment to either increase or decrease the speed.

Every tester is checked and tested for accuracy in direct readings on various standard scales—C, A, D, B, E, F and G scales. Black numerals on dial give direct readings when diamond penetrator is used; Red numerals give direct readings when the 1/16 or 1/8 ball is used. Conversion Readings can be made on the tester.



CLARK INSTRUMENT, INC.
DEARBORN TOOL & DIE CO.

10202 FORD ROAD

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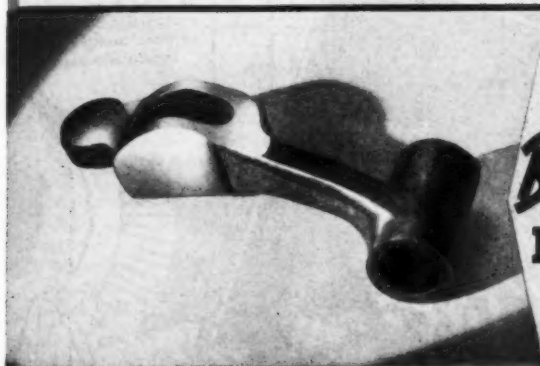
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5224 THIRD - - - DETROIT, MICH.

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GEAR TEETH . . . but
*miscellaneous
profiles*
as well

The Gear Shaper can be modified and equipped to cut teeth or other profiles on taper surfaces.

THERE IS A PLACE for the Gear Shaper IN EVERY SHOP which machines a multiplicity of different parts. Fellows Cutters can be made in an infinite variety of shapes. Because of this versatility it is common experience, even in jobbing shops, to find the Gear Shaper always busy . . . Our book, "The Practical Art of Generating," will give you further evidence of this versatility. Write for your copy.

THE **FELLOWS** GEAR SHAPER
COMPANY

101 St. Springfield, Vermont - 640 West Town Office Building, Chicago, Illinois - 410 E. Franklin, Springfield, Mass.

The Human Factors in Morale Building

Part II—How Important Are You?

By EDMUND MOTTERSHEAD

HOW important are you? Are you indispensable? Maybe, probably not. If you died tomorrow who would mourn? Your immediate family, a few friends, your creditors? In a matter of months or a year or so, you would be forgotten by most people. Probably your friends and family would remember, but they would go right on living just the same.

How important are you in your present job? Suppose something happened, and you were suddenly unable to continue performing your necessary function for your company . . . would it matter? Probably a little, but not too greatly. Two or three people would work a little harder to handle your duties and take up the slack until a replacement was made . . . a matter of a few weeks or months. Business and production would go right on. Very likely you have an assistant who would be only too willing to step up and take over.

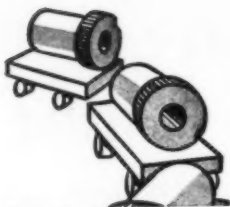
For that matter, how important is the chief executive of this country? He stands as a symbol of national unity. His personal popularity is a great factor in public morale. But we have statutory provision for a Vice President, and a succession of the Cabinet officers to the chief executive's job if necessary. Much of the real work is done by professionals and experts. The vast governmental organization would

go on functioning and industry would continue producing. Undoubtedly we would win the war regardless.

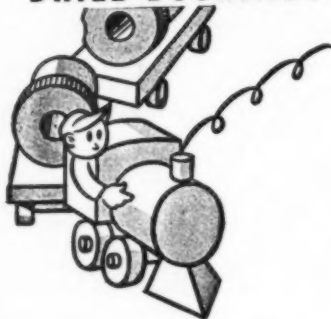
How important are you? To society, to your company, even to your friends and family? Not so important as you would like to believe. **BUT** to yourself . . . **YOU** are the most important person alive!

Professor John Dewey says that the desire to be important is the deepest urge in all human nature. William James says:—"The deepest principle in human nature is the craving to be appreciated." It is this craving for appreciation, this desire to be important





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In these days when speed is all important, your production need not be held up for want of drill bushings. For Universal drill bushings in all standard sizes (not special sizes) are now available on a 3-day delivery schedule. With super-finished bores, straight and round within .0001, Universal drill bushings assure accuracy and unexcelled wearing qualities. Write for facts and prices.

UNIVERSAL

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that makes the richest man in town build a house far beyond his needs and live extravagantly just to display his wealth. It is the desire to feel important that lies behind much of the altruism which has endowed colleges and libraries, schools and research foundations. Columbus wanted the title of "Admiral of the Ocean and Viceroy of India." Washington is said to have wanted people to address him as—"His Mightiness, the President of the United States." Some people acquire bogus ailments and become chronic invalids to satisfy cravings for importance. In business, a man can boast of his sales or production or record, the achievements of his department. He can let himself feel "indispensable."

I'm not throwing stones, but I'd like to ask a few pertinent questions:—How do you get your feeling of importance? Do you like to feel superior to the people under you? Do you enjoy bawling somebody out for a mistake? How many times in the last week have you been mad enough to shout at somebody? Can you take criticism? Do you feel that you are just about the only person alive who can do your job? Are you proud of your self-discipline and a "well regulated life?" Do you get enjoyment out of belittling somebody else?

If you can answer "no" to all of these you are probably not normal anyway, but if the answer is "yes," you might do a little serious thinking.

Because, while personally you are not indispensable to the war effort, the war effort is indispensable to all of us. Victory is indispensable to all of us. The production of your plant is indispensable to the war effort, and not "just enough to get by," but every possible ounce of production.

There is no IF about it. Your ability to get along with the people around you and under you is a definite factor in their states of mind, their happiness,

Now 3

GRAY Coolant PUMPS

PORTABLE-CONTROLLED FLOW

APPROVED

Unanimously by Users!

SAVES Money...Time...

Labor... Equipment!

PROLONGS Tool Life!

STEPS UP Production!



Model G-1. (above) 50 G.P.H. for 1 and 2" spindle drill presses, 1 and 2 spindle tapping machines, abrasive belt finishing machines. Price complete \$39.50, f. o. b. Chicago.



Model G-2. (left) 75 G.P.H. for 1 to 4" spindle drill presses, lathes, small hand screw machines, grinders, small milling machines. Price complete \$49.50, f.o.b. Chicago.

Model G-3. (right) 130 G.P.H. for 4 to 8" spindle drill presses, cut-off machines, large milling machines, large hand screw machines, engine lathes. Price complete \$64.50, f. o. b. Chicago.

**depending on coolant viscosity*



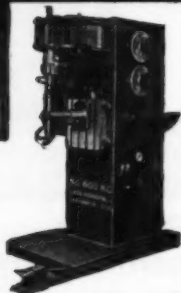
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We manufacture a complete line of **ELECTRIC SPOT WELDERS** from $\frac{1}{4}$ to 500 K. V. A. for welding:

- Brass
- Aluminum
- Bronze
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- Galvanized Sheets
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- Nichrome
- Tin Plate
- Copper
- Nickel
- Silver
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There is an **EISLER WELDER** for every purpose.

Butt Welders to weld from .010" to $\frac{1}{2}$ " dia. metal. We make all kinds of Standard & Special TRANSFORMERS A. C. ARC WELDERS—100 to 400 Amps. LARGE or SMALL QUANTITY CONTRACT SPOT WELDING.

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WRITE TO**

**CHAS. EISLER
EISLER ENGINEERING CO.**

762 So. 13 St. near Avon Ave., Newark, N. J.

and in the amount of work they can turn out. If your relations with others are the best they can possibly be, I'm not talking to you. But if they're not, here are some things to consider:

The people working with you and under your supervision have the same basic desires to feel important. Moreover, it is necessary for them to feel the work they are doing is of greater significance than the simple repetitive processes they may perform.

The other day I overheard a foreman introducing a new worker to a job. The work involved assembling a four-piece cable collection, consisting of a flanged nut, a washer, a center piece and another flanged washer. That foreman knew his stuff. He wasn't content merely to show the man how the four parts were assembled and let him go ahead. Instead he became acquainted with the man, showed a friendly interest in him and in the work he had been doing previously. Then he went on to considerable length to describe the importance of the job the new man was to perform.

It seems that our modern submarines have a great deal of electrical apparatus, which is wired through a switch box. Cables go from the switch box to the batteries. On the side of the switch box is a small hole for the entry of the cable, and right at this hole, the cable connection is screwed onto the box to serve as a support for the cable, taking up some of the tension. After this explanation, the foreman said, "... so you can see the importance of this piece in the whole picture. If this connection isn't well made, if it fails to function, and anything happens to that submarine ... that is bad news for all of us. Now I know that you have been doing a fine piece of conscientious work in the department you just left, and I'm sure you'll handle this one all right." Then, and only after that definite step of impressing

Solved!

Your Turret Lathe Problem

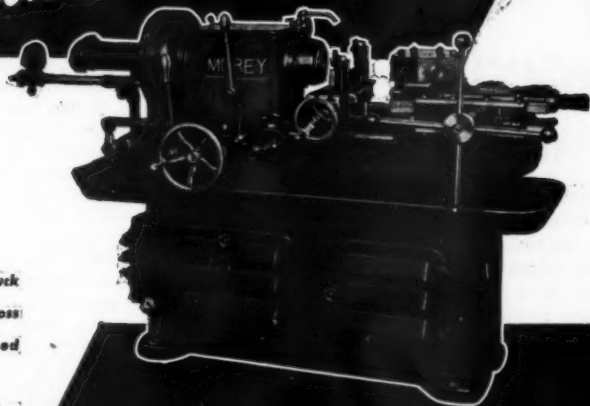
The **MOREY 2G**

1" COLLET CAPACITY

TURRET LATHE

Timken Bearing — Self-Locking Turret — Infinite Spindle Speeds

Quick Delivery



CAPACITY

Automatic Chuck
(round) 1"

Swing over cross
slide 6"

Swing over bed
14"

Full description
and detailed il-
lustrations are
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TODAY!

Join the parade of high speed defense producers with the MOREY 2G Timken Bearing Turret Lathe, with Self-Locking Turret. You are assured vibrationless precision with an infinite variety of spindle speeds for every job. It's designed to take full advantage of high speed and carbide tools. Back gears are instantly thrown in through extra large Twin Disc Clutch. Can be furnished with Tooling!

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TRUE Thoroughbreds, made of the finest quality bortz and resinoid bond, for sharpening cemented carbide tools faster, to a flatter surface and higher finish, more economically, **SECOMET RESINOID BONDED DIAMOND WHEELS** are available in a wide range of standardized sizes and types to enable you to select a suitable wheel to meet any ordinary requirements, for extraordinary results.

Write for our new price list or full details on any type of diamond wheel.

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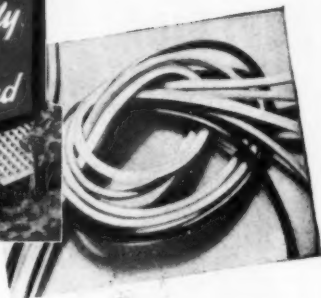
7 So. Main St. Law & Finance Bldg.
W. HARTFORD PITTSBURGH

upon the worker the importance of the job, did he show him how to do it and put him to work.

That foreman accomplished several things.—He recognized the new worker as an individual, made him feel at home, was friendly with him and took the first step in creating a strong personal loyalty between that worker and himself. He also mentioned opportunities for advancement and thus enlisted the workers' desire for promotion and increased pay. Then he showed him the vital importance of the very simple operation of assembling the four pieces of cable connection so that a routine repetitive task would have an interest for the man. And finally he showed an appreciation of his ability and conscientiousness and threw down a challenge to that good reputation so the man would do his very best. The upshot of the whole thing was that the worker's desire to feel important was satisfied in a dignified and friendly way . . . incidentally paving the way for a faster learning time and a shorter time before the new man reached the required production speed.

The National Foremen's Institute outlines 10 characteristics which they say are essential to good foremanship. These are:—1. Quality control. 2. Mechanical ability. 3. Cost consciousness. 4. Planning ability. 5. Progressiveness. 6. Cooperativeness. 7. Forcefulness. 8. Initiative. 9. Teaching ability. 10. Judgment.

It is worth noting in passing that of these 10 factors, 5 involve the strictly human factor, 3 the mechanical factor, and 2 are half-and-half. Human relations lie at the base of every problem of production, and even though shortages, increased demands, priorities, and taxes bring extra difficulties and extra pressures, a smooth handling of the human problem and skill in dealing with people will make many rough spots disappear.



These tests prove **FLAMENOL WIRE**

REG. U.S. PAT. OFF.

Ideal for machine-tool wiring

SEEKING a machine-tool wire that would resist damage from splashing oil and coolants, one of the largest automobile manufacturers tested 1000 feet of Flamenol. Here are a few of the tests:

1. They gave it a high-voltage test.
2. They tied it in knots and gave it severe mechanical abuse.
3. They soaked it in a mixture of oil and machine-tool cutting compound.

Flamenol wire passed all these tests. The automobile manufacturer ordered 40,000 feet—later ordered 60,000 feet more—and have purchased to date more than 1,000,000 feet

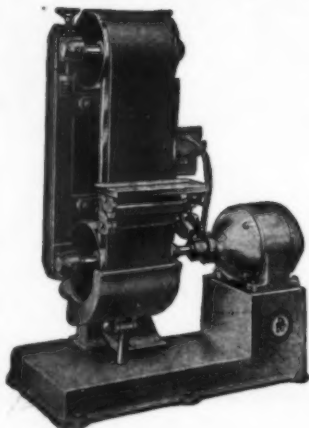
of Flamenol wire. A number of other automotive manufacturers have followed suit—wiring practically all their machine tools with Flamenol—as well as using it in other factory locations, for leads and for panel- and control-wiring.

A choice of 12 colors makes it easy to identify circuits. In addition to being flame-resistant, Flamenol is ink-, oil-, and water-resistant. And it's flexible and easy to install.

Facts about any specific installation that you may want to know about are available from our local office or from General Electric Company, Schenectady, N. Y.

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Eliminate costly hand sanding and filing. In many cases, a rapid cut on a Peerless may eliminate an expensive milling or planer operation. The advantages of a straight-grained finish and the economies in time and material resulting from use of the abrasive belt method warrant careful consideration of Peerless Surfacing Machines. 4' to 20' width of belt. Vertical and Horizontal. Also Reed High Speed Sensitive Drills and Greenfield Universal Tool & Cutter Grinders.

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MACHINE CO.**
GREENFIELD, MASSACHUSETTS

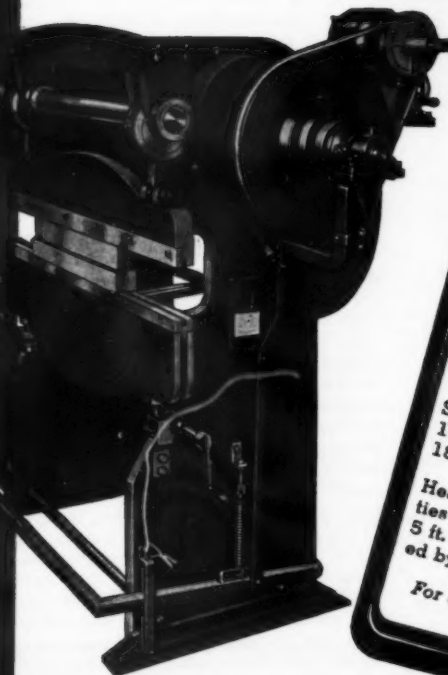
Some time ago a friend of mine was invited to join the Rotary Club. After a couple of months, the club selected him to be in charge of a committee to reclaim delinquent boys who previously had been sent to the state reformatory and consequently had need of rehabilitation. My friend happens to run a small repair shop, and he almost always has four or five of these boys working for him. The last time I talked with him I asked him how his boys were coming along. He said:—"Well, it's like this. As long as we can make 'em think that what are doing is important, they come through for me. If I say to Jim Hicks:—"Now this is a darned fussy, ticklish job, Jim; if you can't handle it just call me," Jim will turn out some fine work." That's the whole thing . . . the feeling of importance . . . the challenge. We all want to feel that we are doing something of value and importance, and get a little appreciation of it from others, especially from the boss.

I am particularly fond of one story from the life of Charles Schwab. It seems that Schwab at one time had a mill manager whose men were not producing their quota. Schwab asked him how it happened. The manager replied that he had tried coaxing and pushing and profanity and threat of discharge and that nothing got results. At the end of the day, just before the night shift came on, Schwab stood in the mill talking with the discouraged manager. He pulled a piece of chalk from his pocket and turned to the nearest man and said, "How many heats did your shift turn out today?" "Six!" Without another word Schwab scrawled a big six on the floor and walked off.

When the night shift came in they saw the big six and asked what it meant. The men told them what had happened. The next morning when Schwab walked through the mill the

POWERFUL

CHICAGO STEEL PRESS BRAKE



This No. 253 is a **POWERFUL**, rugged, inexpensive Press Brake, designed and built to the standards of Chicago Steel Forming Presses.

This money-saving production tool will handle 40 to 50 percent of the work done in an average shop. Greater speed, higher efficiency—much lower operating cost—plus the highest quality material and sturdy welded construction as in our larger machines.

Standard Series—3 sizes—capacities
14 gage, 4 ft. long; 16 gage, 5 ft. long;
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10 gage, 4 ft. long, V die; 12 gage,
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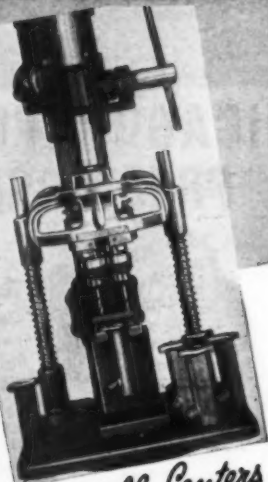
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for catalogs.

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7440 LOOMIS BLVD.,

CHICAGO, ILL.

LINCO Two Spindle
ADJUSTABLE
DRILL HEADS
Drills Two Holes at Once



✓ *Adjustable Centers
 from 1/2" to 6"*

✓ *Drill Capacity 0 to 5/8"*

Sleeve and overarm types . . . several sizes. Will double production of any single spindle drill press. Quickly adjusted to any desired drill centers from 1/2" to 6".

Send for descriptive bulletin.

LINDERME MACHINE & TOOL CO., INC.
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night shift had rubbed out "6" and put down "7". The day shift came back and saw it there and thought they'd show the night crew a thing or two and left at the end of the day with a big arrogant "10" on the floor.

Schwab had the master touch in handling his men. He considered his ability to arouse their enthusiasm his greatest asset. Time and again he did it with some simple act such as this, throwing down a challenge to excell. He believed in stimulating competition, in praising good work and in "giving a dog a good name."

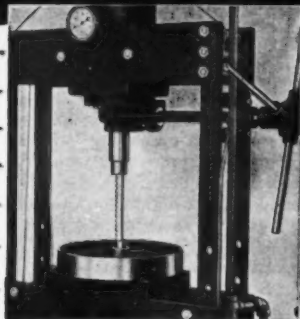
Warden Lawes of Sing Sing has said that if you must deal with a criminal, there is only one way to handle him effectively . . . treat him as if he were an honorable man. Act on the assumption that he is on the level with you. He will not only be flattered with such treatment, but he will also be proud for once in his life that someone trusts him. Give him a good reputation to live up to.

Your own individual circumstances will, of course, determine to a large extent how you find it possible and practical to act on these principles. It may be that in a very large organization, where you are a top executive, simply recognizing as many of the workers by name as you can will get results. If you are closer to the men and have a chance to point out the importance of their work and praise their efforts and skill, do it at every opportunity. Remember that Schwab was paid a million dollars a year because of his ability to do just that . . . among other things. Remember how that unsung foreman introduced the new worker to his simple job of assembling the cable connections. Do everything you can to make the work interesting to the men and praise them for their interest.

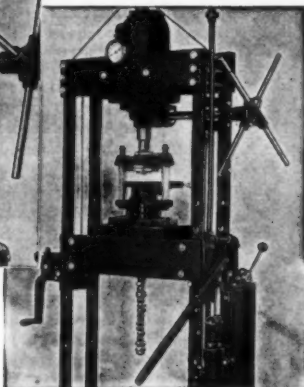
But you can't be too obvious or "Boy Scoutish" about it. A sudden change from the habitual sourpuss to the fa-



EVERY DAY FINDS NEW WAYS OF SAVING TIME AND LABOR WITH KRW HYDRAULIC PRESSES

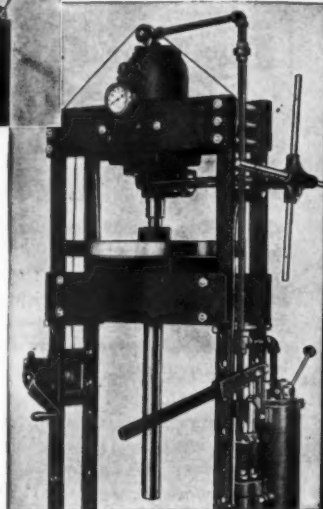


Above: Broaching a key way in a flywheel on a 25 ton KRW Press. A ram travel of 7½ inches makes this and similar broaching operations possible on KRW Presses.



Left: Using a KRW Camshaft Timing Gear Fixture for replacing the timing gear on a Ford V-8 Camshaft. Special Fixtures such as this can be designed to give accuracy and speed to almost any operation, utilizing the KRW Press as the prime mover.

Below: Pressing "home" a long shaft in a flywheel. Bed can be adjusted to desired position quickly and easily.



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Send for your copy of the new 16-page bulletin describing in detail the NEW 2 Speed Pump—the Lever Controlled Valve that opens or closes with a flip of the Ball Arm—and many other patented features found only on KRW Presses.

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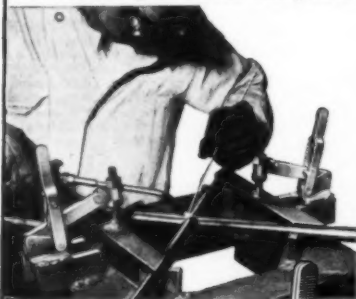
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TYPES



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A complete line, all sizes, each clamp carefully engineered for quick, positive action and long useful life. Thousands of De-Sta-Co Toggle Clamps now used to speed up work in National Defense plants.

Bulletin No. 41 illustrates clamp uses;
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Established Over 25 Years
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miliar friend with a shining smile might look a bit fishy. H. P. Williams, one of the great names in American advertising, many times remarked that there was but one rule in dealing with people and that rule was golden. And that if you really did unto others as you would have them do unto you, they would do it. BUT, that you couldn't do it for that reason! It had to be sincere in the first place.

By a single act or deed in a single circumstance, you may create a very definite impression on your men, but that impression is subject to the test of time. You may be kind to one and harsh to the next, and your own reputation will probably be that of a harsh man. "The evil that men do lives after them . . ." But there is a plan by which you can build your own reputation among your fellow workers and at the same time satisfy their desire for a feeling of importance and enlist their loyalty and enthusiasm. There are four steps:

1. Determine the nature of the reputation you want your men to live up to. Analyze its specific traits, how it can be manifested in quality and quantity of work, in cost consciousness, in cooperative attitude, in any of the desirable characteristics of a good worker or a good foreman. Make a list of them and memorize it.

2. Take every opportunity to call attention to the display of these favorable traits among the men. Be generous in your praise of good performance of any of the qualities you have selected. Emphasize the good. Ask for more of it. Encourage it. The undesirable will gradually atrophy, and as soon as another good habit shows any signs of appearing, seize upon it and encourage it also.

3. Be consistent about it. Under the strain of carrying many burdens in your mind it is all too easy to pass people without noticing them. By and

INCREASE PRODUCTION REDUCE COSTS—

Convert your present machines
for efficient war production
with the new

BRADY-PENROD
Replacement Coolant Pump
MODEL 600



The advantages of this open-impeller centrifugal coolant pump are apparent at first glance. Here is a pump that stands up under hard usage twenty-four hours a day, seven days a week, without replacements. Model 600 is not a makeshift pump but the newest addition to a quality line—identical in general construction to the other five BRADY-PENROD models used as standard equipment by machine tool manufacturers.

Motor Size Is Important!

Through superior design, the 1/2 H.P. NEMA motor moves as much liquid as formerly handled by a 1/4 H.P. motor, at negligible current cost. Motors are available for all current specifications.

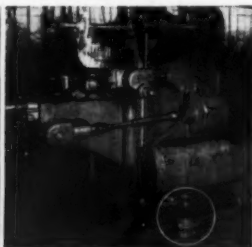
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**Hydraulic Efficiency
As High As 70%!**

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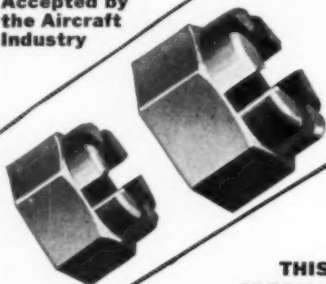
CONTROLLED FLOW

Pump will deliver water or light oil at the approximate rate of 60 gallons per hour with 3/8" tubing to 1,200 gallons per hour with 1" pipe.

EASILY INSTALLED

Any shop man can install the Model 600 easily and quickly at little cost.

Accepted by
the Aircraft
Industry



THIS
SPECIAL
PURPOSE

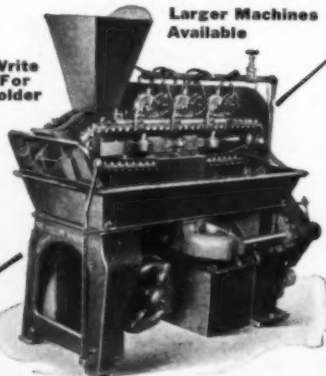
NUT SLOTTER

OFFERS YOU:

- 6 CUTTERS MILLING
CONSTANTLY
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to $\frac{15}{16}$ HEXAGON ACROSS FLATS

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large, people are unnecessarily sensitive. They are prone to feel slighted, usually the result of an entirely unintentional act on your part. BUT, you can't change human nature; you can neither ignore it nor work against it. You have to work with it. So make the effort, consistently, every day to be pleasant, to smile, give them at least a friendly nod in passing.

4. Don't undermine what you are doing by showing any lack of confidence in yourself or in the men! Confidence begets confidence. When you throw down the challenge of a good reputation to be lived up to, make sure they see that you are confident of their ability to live up to it.

I might summarize our little plan:

CHOOSE your objectives and then—

PRAISE good performance as—

CONSISTENTLY as you can, always showing—

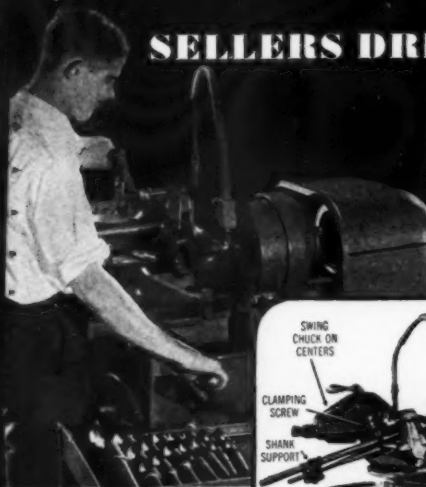
CONFIDENCE in the men and yourself.

How important are you? Maybe you have that figured out by now, but I'll tell you one thing:—The less important you become to yourself, the more important you will become to those around you, to your friends and family, to your firm, and to the people working with you. Only YOU can give them your appreciation of the value of their efforts. Only YOU can give them your smile and greeting. YOU and you alone can make a particular addition to their happiness and satisfaction with life.

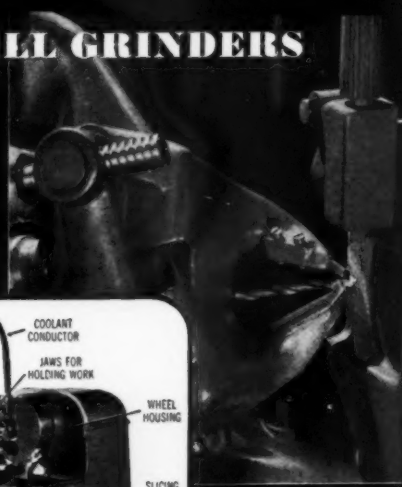
Why not try it?



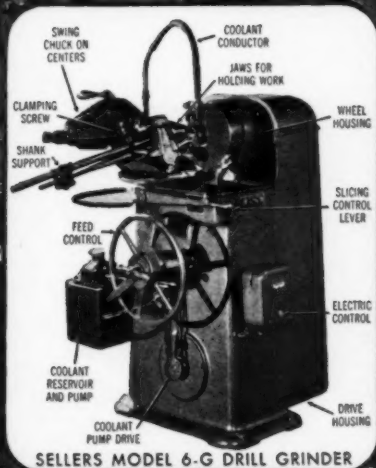
SELLERS DRILL GRINDERS



EASY TO OPERATE



GRINDS DRILLS AS SMALL AS 1/4"



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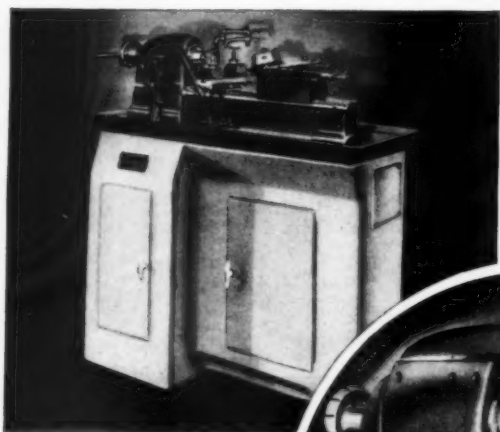


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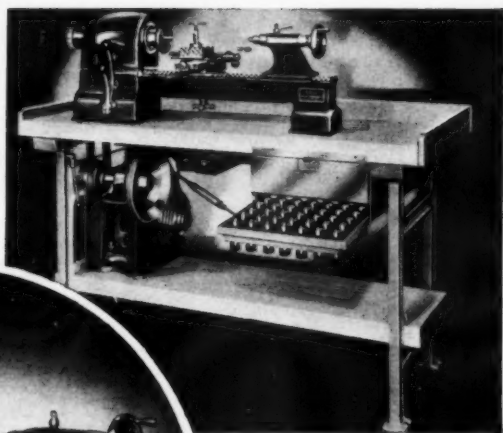
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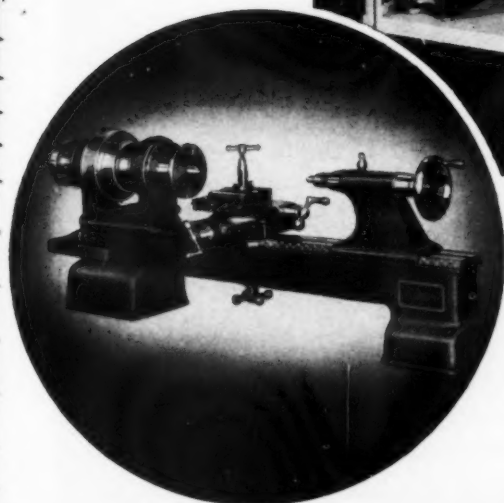
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"Light" Tools in War Production

By H. J. CHAMBERLAND

THE fact that a heavy duty floor type machine tool is being operated 24 hours a day is no sign it is producing at its maximum efficiency. The truth is that from the standpoint of production, any piece of machine equipment can be taken on a disastrous ride via three different routes.

Overloading will invite premature wear and consequent repairs that delay production. The productive limits of a machine tool can also be shackled when it is used for operations that could be handled more advantageously with specialized equipment, reducing labor and material costs. Last but not least, when a heavy duty machine is

given too light a task to perform, production costs tend to rise because machine and operator are on half-time with full pay.

The term "bench machine tools" as used in this article particularly covers the junior lathes, drill presses, shapers and milling machines. These are precisely scaled-down counterparts of highly engineered floor type equipment. It doesn't make sense to pass up these lighter tools for all possible operations within their range, in these times when all tools are needed.

There are also three important reasons why the economy of bench machine tools should not be overlooked:—



Fig. 1—An airplane plant set-up with each drill doing its own particular drilling operation.

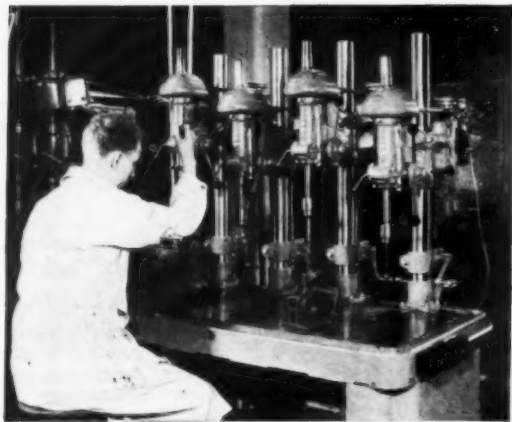


Fig. 2—A multiple spindle unit used in jig work where a number of holes of different sizes are involved. The parts shown are pumping units for lubricating systems of grinding machines.

low initial cost, low tooling cost and low power cost. Too many plant executives seem to overlook the fact that bench type drill presses, lathes, shapers and milling machines, of ball and roller bearing construction and fully equipped

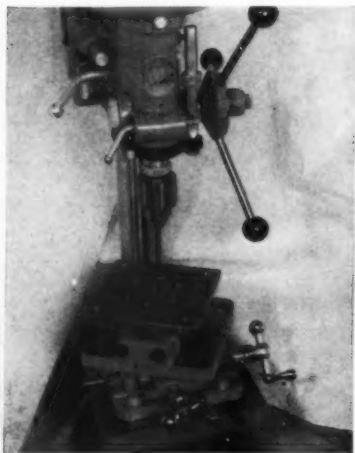


Fig. 4—A universal compound vise added to a bench drill increases versatility. The bench drill then becomes an inexpensive precision unit for indexing holes.



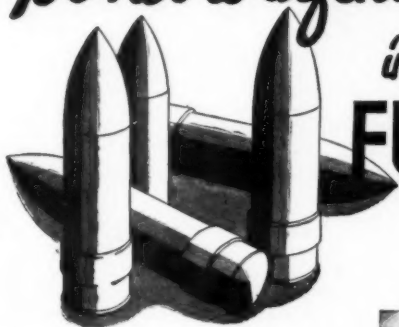
Fig. 3—A multiple drilling head as shown speeds production drilling. with tools and accessories, can all be set up ready for production on a very modest investment.

We can, of course, safely assume that some 75% of all war production cannot be executed in bench machines, due to weight, design, etc. On the other hand, there is plenty for the

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War production of shells has been increased by the use of "AMERICAN" broaching equipment.

The photograph at the right shows the operation on an "AMERICAN" T-6-32 three-way type vertical hydraulic broaching machine arranged for surface broaching end and slot on magazine fuse cap. The material of the part is bronze and four parts are broached simultaneously. A tilting air-actuated work table facilitates loading of parts while machine is making return stroke.

Production of 600 pieces per hour is obtained.



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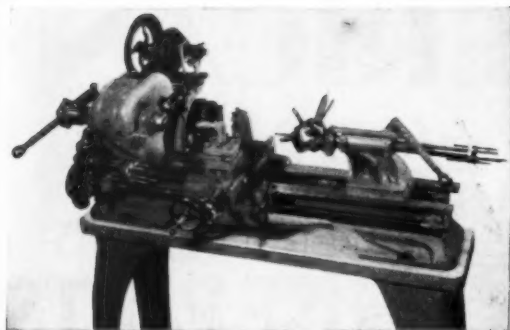


Fig. 5—A small bench lathe relieved of its regular duties and "dressed up" with turret lathe attachments.

small machines to do, considering the huge volume of interchangeable parts and related tooling involved.

It seems but a few years ago that a single bench lathe in some tool rooms and production departments was a customary set-up. The bench lathe was regarded as more or less of a toy for the apprentice to play with, or a neglected tool to do an occasional filing or polishing job.

A bench drill press was a novelty. One used for 1" holes was considered as good enough for $\frac{1}{8}$ " holes. Bench shapers and millers had not been developed for the simple reason that so little attention was paid to the junior lathes that there was little need for

additional equipment in the same category.

Automobile plants discovered the economy of bench machine tools several years ago, when it was found that many small parts were being machined on equipment that was much heavier than necessary, and that small machines could help reduce production costs materially.

Bench type machines have also played a prominent part in expediting plane production. Battery after battery of small drill presses, lathes, shapers and milling machines now release heavier equipment for the making of numerous parts, not only at a saving in labor and overhead costs but

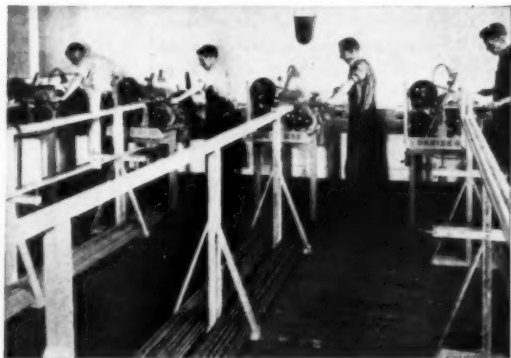
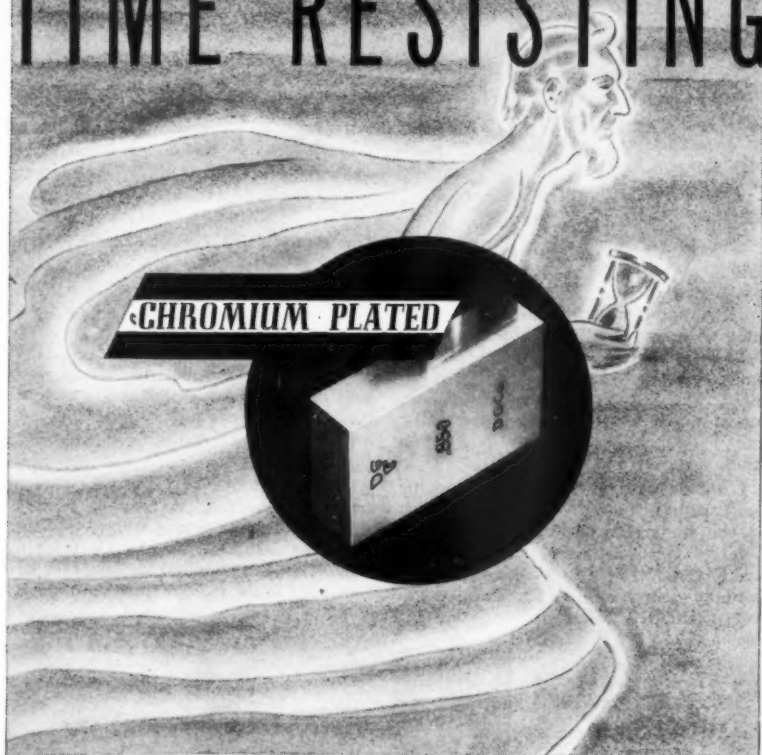


Fig. 6—A production line of modern bench lathes, giving an idea of their versatility and productivity.

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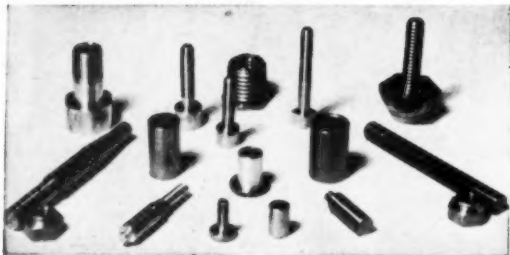


Fig. 7—The installation shown in Fig. 6 produced the 17 parts shown here. Production rate is high and costs low when compared with machining these small parts in larger screw machines.

the standards of accuracy are raised in many cases.

All manufacturers of the heavy floor type equipment do not hesitate to install as many small machines close to the large ones as the nature of the work requires. They know that in many cases, the operator of a large machine which performs automatically, can meanwhile well take care of a small machine in addition.

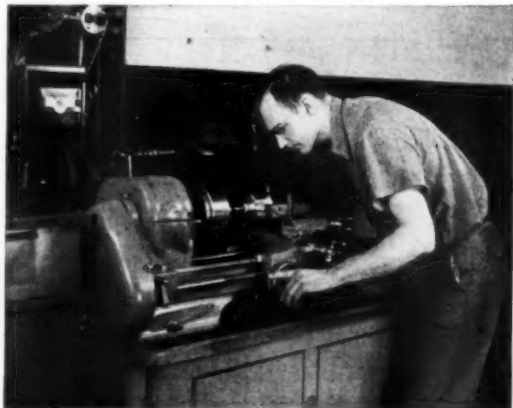
I am convinced that bench machine tools should be of particular interest to the thousands of sub-contract shop owners now helping to speed up war production. Let us consider what is actually being done with these small but productive machines.

The Bench Drill Press

While a substantial number of bench drill presses are operated independently, as shown in Fig. 1, a marked economy lies in their multiple arrangement as revealed in Fig. 2. Fig. 1 is an airplane plant set-up where each unit has and completes its own particular drilling operation.

The multiple spindle unit in Fig. 2 is particularly intended for jig work where a number of holes of different sizes are involved. A massive production type table permits smooth shifting of jig or fixture from spindle to spindle. The parts drilled in this case are pumping units for the lubricating systems of grinding machines.

Fig. 8—Here is a job that would be out of place anywhere but on a bench lathe. Grinding of very small bores in cold headed dies with a small air grinder on tool post is shown.



Here's why shops *busy on the armament program* insist on *Delta Grinders*

1. Special motors designed and balanced exclusively for Delta grinders.
2. Grinder wheels dynamically balanced to 1/100 inch-ounce.
3. Double sealed-for-life ball-bearings—lubricated for life—sealed against grit.
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Metal Cutting Band Saw cuts almost anything in metals and plastics.



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A low-cost attachment readily transforms any small drill press into a precision threading machine, but minimum cost drilling is attained when a multiple drilling head is made to step in, as shown in Fig. 3.

As shown in Fig. 4, a nominal investment in a universal compound vise makes the bench drill an inexpensive, precision unit for indexing holes in straight lines, in two directions or for circular drilling.

Small drill press heads often have solved perplexing problems and saved the cost of expensive drilling machines. The procedure is usually in connection with medium or heavy type drilling machines, where one or two small drill press heads have complemented regular equipment. The operation intended for the heads is to drill horizontally or at some angle simultaneously with the regular spindle which is often fitted with a multiple drilling head.

Well devised set-ups of this nature have often saved many times their cost.

The Lathe

The modern 10" backgeared screw-cutting lathe needs very little introduction beyond stating that it is indeed a multi-purpose machine tool in every sense of the word. Modern design, including such features as: precision-ground bed ways, roller bearing spindle, automatic power cross and longitudinal feeds, and ease of control make the bench lathe an indispensable small machine tool for war production items within its range. There is no denying the versatility of a lathe. It is capable of handling more operations and more types of operations than any other single unit of equipment.

The mere facts that bench type machines are intended primarily for light work is no reflection on the quality of materials going into their construction. Beds of close-grained and well seasoned semi-steel, scientifically box-ribbed for rigidity and to guard against heavy turning forces, guarantee de-

pendable performance and accuracy of the modern bench lathe. This also applies to head and tailstock where weight must also be proportionately distributed. No less important are the construction details of the carriage which must coincide with the advanced features of highly engineered floor type lathes. Dependable screw-cutting bench lathes are indispensable in many phases of war production.



Fig. 9—An external precision grinding operation being performed on a bench lathe. The tool post grinder is operating with a 4" diameter wheel, giving an excellent finish and holding to close tolerances.

As shown in Fig. 5, the bench lathe can well be relieved of its regular duties and be dressed up to "go places." Study of Fig. 6 will give a hint as to the versatility and productiveness of a modern bench type lathe.

As readily seen, 4—10" lathes are economically equipped as small screw machines, by the addition of a lever type collet chuck, tailstock and carriage turret attachments, as per Fig. 5.

It's the GRINDER that makes the DIFFERENCE



ABOVE: It's the cutting edge that counts. On top is tool ground on an ordinary grinder; the bottom tool was conditioned on an Ex-Cell-O Tool Grinder.

*W*ith the widespread use of carbides and other hard materials for cutting in today's strenuous race for production, the proper conditioning of cutting tools is more essential than ever to efficiency and speed. Ex-Cell-O Carbide Tool Grinders are made specifically to do this necessary job of good grinding—their use cuts down grinding time, improves finish, speeds up production, and increases tool life.

EX-CELL-O CORPORATION

DETROIT, MICHIGAN

TO LEFT: Bench-type grinder, one of six styles of Ex-Cell-O Carbide Tool Grinders. Full details in Bulletin 46101, free for the asking.



EX-CELL-O means PRECISION

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Precision
MACHINES AND TOOLS



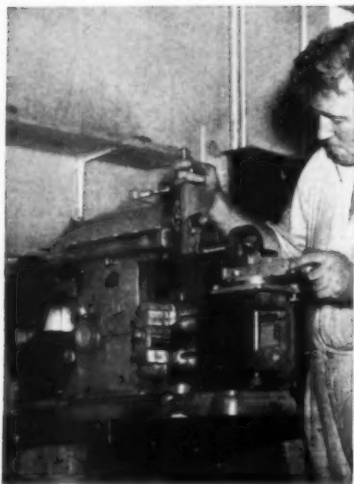


Fig. 10—A cost reduction of 30 to 40% is claimed by use of this battery of small 7" shapers for making laminated phenol aircraft fittings.

Fig. 7 shows 17 parts produced through with the installation shown in Fig. 6. Production rate is high and production costs are relatively low compared with machining these small parts in larger screw machines.

Shown in Fig. 8 is a job that would be out of place on anything but a bench lathe. In this case, the small lathe is giving a good account of itself in the grinding of a very small bores in cold headed dies with a small air grinder mounted on the tool post. This is a precision grinding operation performed on a production basis.

Fig. 9 shows an external precision grinding operation also performed in a bench lathe. The tool post grinder in this case operates with a 4" diameter wheel. It gives an excellent finish and holds to close tolerances.

Shaper

The bench shaper was a most welcome addition to the junior tool family when it was introduced to industry

a few years ago. The fact is that many machine parts and tool blanks had necessarily been shaped previously at a high cost of production in relation to the small dimensions involved.

A so-called 7" shaper has sufficient applications to keep it busy most, if not all the time, even in a small shop. Similarly to the bench lathe, the bench shaper means low initial cost, tooling cost and power cost. In fact, a 1/2 hp motor gives shaper spare cutting power.

This most useful bench type unit is compact, easy to set up, fast, precision-made and therefore machines to utmost accuracy. For the smaller jobs, the bench shaper incorporates all the versatility of a larger shaper and should be given the preference for all work within its capacity.

Fig. 10 shows a typical war production 7" shaper installation. In this case, the parts are laminated phenol aircraft fittings and it is claimed that a battery of these small shapers has reduced previous production costs of

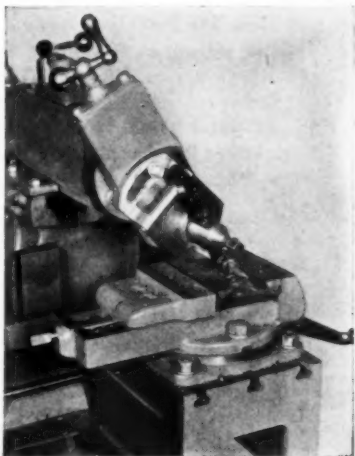


Fig. 11—The ready adaptability of a 7" shaper in cutting small dovetails or other forms is shown here.

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Haskins designed standard nut fixture with an air operated plunger positions these $\frac{3}{8}$ " hex nuts and ejects them after tapping. Operator has only to place the blanks in the hopper. Class 3 fit.

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WHEN Victory is won—when war time emergency needs have passed—Haskins Tappers will continue to pay big dividends in lower tapping costs per man and machine hour.

A simple adjustment or two—perhaps an inexpensive fixture change—and these standard machines can be quickly set up for the normal needs of private industry.

Much more than a temporary speed-up measure, Haskins Tappers are a profitable, long-term investment in production efficiency! R. G. Haskins Company, 624 S. California Ave., Chicago.



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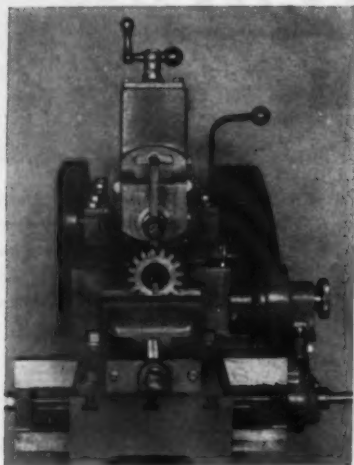


Fig. 12—A 7" shaper is the logical tool for small jobs like this.

numerous aircraft parts by 30 to 40%.

Incidentally, this aircraft parts manufacturing plant has dozens of other bench type machines such as drill presses, lathes and milling machines, all fully equipped and operating at full capacity 24 hours a day.

Fig. 11 shows ready adaptability of

the 7" shaper in cutting small dovetails or other angular forms.

Fig. 12 demonstrates its economy for light operations where the use of a large shaper hardly makes sense.

As revealed in Fig. 13, a copper and brass parts manufacturing plant finds enough to do for their 7" shaper to keep it continually on the run. It is obvious that they are saving money by using the small shaper for the smaller jobs.

Milling Machine

The bench type milling machine is the latest addition to the family of smaller metal-cutting units intended to relieve large equipment. The bench miller has as big a job to perform in expediting war production as the bench shaper, lathe and drill press.

We have had, of course, small floor type milling machines but, generally speaking, they have been limited to manual table feed which results in more or less uneven cutting action and meanwhile ties operator to single unit.

A substantial range in table working surface, longitudinal and cross feeds, vertical adjustment and the convenience of automatic traverse, makes the bench miller useful in the precision milling of an endless number of small

Fig. 13—By using this small 7" shaper for small jobs and releasing large machines for large jobs, this copper and brass parts manufacturer saves money and has his large machines available for the work they are best fitted to do.



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*Production Quota



PERFORMANCE DATA
OPERATION: Turning 8" dia.
MACHINE: Wynn & Sweeney
2 1/2" Universal Heavy Duty
Lathe Series
CUTTING FLUID: 1 qt/hr
Spindle speed: 1000 rpm



SUN PETROLEUM PRODUCTS HELPING INDUSTRY HELP AMERICA

parts. Similarly to the bench shaper, the small miller has all the versatile points of modern plain floor type machines. Such operations as routing, facing, slabbing, slotting, saddle milling, gear cutting, layout drilling and boring, dovetailing, etc., are just everyday jobs for a well balanced unit.

With a $\frac{3}{4}$ " arbor and No. 2 Morse taper shank, plus a variety of spindle speeds from 54 to 3225 rpm, fairly large cutters of modern design can be used to advantage.

Fig. 14 shows a bench miller in the same plant at the Fig. 10 set-up. The operator is making necessary adjustments for a milling operation on lami-



Fig. 14—A bench miller in the plant of the same laminated phenol aircraft fitting maker shown in Fig. 10. Fig. 15 (left) shows a handy bench arbor press.

nated aircraft fittings. As previously stated, the plant has a substantial number of these small millers, delivering a high rate of production and close tolerances.

With every three or four bench lathes or milling machines should be included a small bench arbor press such as shown in Fig. 15. It certainly can pay for itself in a short time if non-productive steps mean anything.

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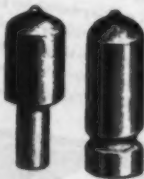
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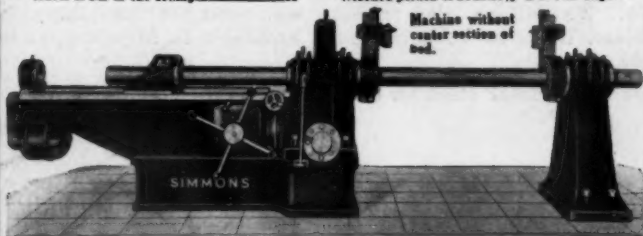
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This new Simmons 6" Bar Horizontal Cylinder Boring and Facing Machine is the ideal machine for current War Production requirements. The bed is of massive construction and heavily ribbed to insure maintained alignment. Available with or without center section of bed.

Equipped with Simmons Micro-Feed Unit, an infinitely variable transmission, this boring machine offers both fine and coarse feeds ranging from .004" to 1.000" per revolution of spindle. The main drive to the boring bar is obtained through a six-speed gear box, motor-driven. Gears are of high-carbon steel and mounted on spline shafts with anti-friction bearings running in oil. Power Rapid Traverse to bar in both directions. Write TODAY for Descriptive Bulletin.

SPECIFICATIONS

Diameter, Boring Bar	6"	Capacity of facing heads	9" to 38 1/2"
Travel of bar in one setting	50"	Widened portion of bed	51 1/2" x 95", 15" High



Machine without center section of bed.

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NEW YORK CITY OFFICE: 149 BROADWAY

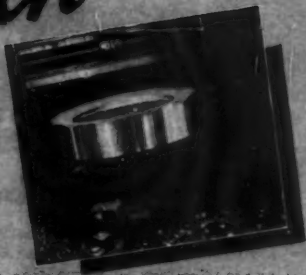
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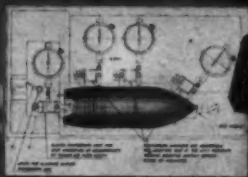
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Fig. 1—Here is production setup of the shear, bender, and brake shown in Figs. 2, 3, and 4 for producing formed channel sections.

Metal Duplicating Without Dies

By A. T. O'NEIL

WHEN a run may be more than a thousand pieces, the large cost of making special dies can usually be absorbed without too much difficulty. But when the run is a thousand or less pieces, the die problem becomes difficult.

Making special dies is too expensive, so it is necessary to turn to some of the hand-operated bench machines as an alternative. Interesting examples of equipment of this type will be found in the Di-Acro series of Shear, Bender, and Brake shown from right to left in Fig. 1, and made by O'Neil Irwin Mfg. Co., 314 8th Av., S., Minneapolis, Minn.

These machines are very versatile, as they can handle strip metal; round, half round, or flat wire; round or square tube; and shape such material into most any angle, bend, or kind of channel. Also they will handle many types of metals, including aluminum, brass, bronze, copper, iron, monel metal, cold rolled steel, spring steel, stainless steel, etc.

Skilled labor is not required, even in setting the machines, and because of their ease of operation, they can be run by women or youths.

A setup can be changed easily to

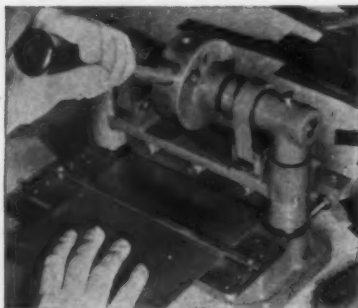


Fig. 2—Bench shear can be set up with stops for precision work.

handle a particular type of work and then changed back to duplicate the original setting with tolerances not to exceed .001", it is claimed. Stops and material guides facilitate operation up to 1000 pieces per hour, depending upon the material and type of work.

A typical cycle of operations is shown in the accompanying illustrations. Fig. 2 shows the material being run through the duplicating shear and cut to the

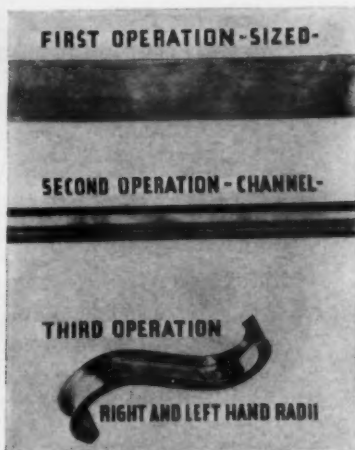


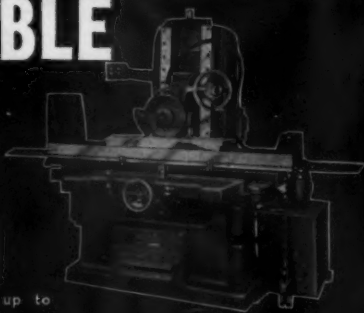
Fig. 3—Typical operations of sizing, forming and bending channel section.

size required. In Fig. 4, the material is being run through the bending brake to produce the correct size angle or channel. And finally in Fig. 5, a radius is being formed by running the mate-



Fig. 4—Heavy duty bench bending brake for forming channels or angle sections to any combination desired.

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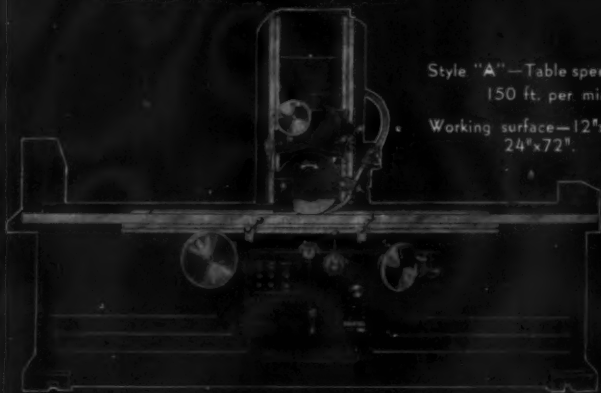
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Style "A"—Table speeds up to
150 ft. per min.

Working surface—12"x36" to
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Fig. 5 — Die duplicating bender easily forms right or left hand bends in channel. With simple conversions can handle much other forming work within precision limits of .001".

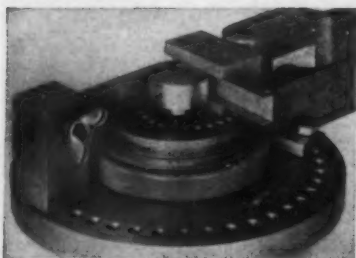


Fig. 6 — Close-up of forming nose and mandrel, which are readily adjustable to bend channel material in any shape.

rial through the bender. Conversion from right to left hand radii is made in only one operation. A few of the different types of parts produced are shown beside the bender.

Fig. 6 shows bender set to produce bend on open side of channel section. A simple conversion for producing outside bends in the same material can easily be made. Other pictures accompanying show the simplicity of conversion and the wide range of work that can be handled.

For instance, the set up for making bend in solid rod is shown in Fig. 6a. Only a simple change is necessary in the forming tool to convert the unit to handle tubing. Different bends can be accommodated by simple adjustments. The roller bears against a hardened semicircular section, reducing friction or sliding against tube surface.

The unit is converted to bending flat stock merely by changing the center form and the tool nose (see Fig. 8). Notice especially the holes punched in the piece immediately below the strip,

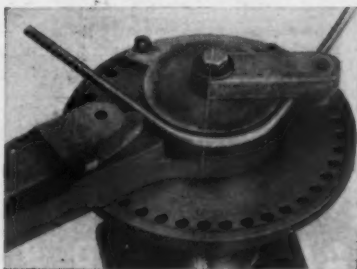


Fig. 6a — Conversion to work on forming solid rod, using different nose and mandrel than in Fig. 6.

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MED-6A

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Fig. 7—After making vertical bends shown at right, same bender is converted easily for forming edge bends in this copper bus bar for a switchboard.



Fig. 8—Flat strip is formed easily to almost any radii and angle of bend. Changing the stops and pin makes accurate settings of machine possible for wide range of work.

accommodating the pin which contacts the outer surface of the strip, holding

it in place during bending. By varying the position of the pin, a large variety of shapes can be handled.

A rectangle bend may be made simply by changing the center fixture of the unit. Fig. 7 shows various acute bends, including edge bends in flat strip made with a simple conversion of the machine.

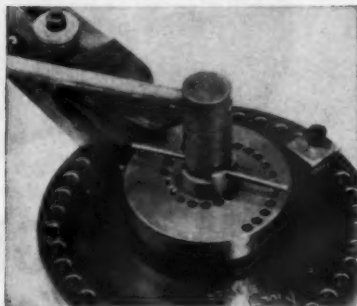


Fig. 9—Set-up for coiling a spring from a straight bar. Coiling tool is shown just starting to form spring. By changing diameter and slope of mandrel, coil diameter and pitch can be made any value desired.

Fig. 9 shows the operation of coiling on this same unit. The winding tool is inserted over the mandrel on which the coil is wound. Merely by changing the diameter of the mandrel and hole in the revolving tool, the work can be coiled to different diameters.

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The Art of Hand Filing

By CARLETON CLEVELAND

HIGH speed machines and power tools are doing great work in connection with our mass production war efforts, but the importance of skillful use of the hand file in machine shops must not be overlooked or considered as outmoded. Despite the fact that hand filing represents manual labor, muscular exertion, in direct opposition to the modern trend of powered tools, the hand file has its rightful place, as every highly trained mechanic well knows. Although industrial machinery has been developed and refined to an advanced degree, there still remain many kinds of work in which hand filing is an important operation.

The good filer, like the master violinist, understands the importance of proper stroking. He will begin each stroke carefully, knowing just where he is placing the tool, and will pick up speed as he "feels" the file take hold. Each stroke is made at a steady speed, the pressure being relieved so as not to stop in the cut at the finish of the stroke. He learns the feel of various files for various metals and regulates the pressure and speed of each stroke to accomplish the exact purpose demanded in the particular work he is doing.

The hand file has been referred to as a "metal cutting gang tool," each tooth being a metal cutting tool, and with all of the problems of a metal cutting tool. For this reason the proper selection of

files is important, while at the same time the uniform replacement of files is vital, enabling the filer to anticipate the feel of any file he picks up in the course of his work.

Handles are also important to prevent slipping during the rhythmic strokes developed during filing operations. The good filer therefore has his tools properly equipped with suitable handles, providing grips in which he has faith. Some filers work out a color code in connection with their file handles, indicating by different colored handles the cut of the files or the par-



ticular type of work for which each is reserved. Sometimes the colors may indicate the various qualities of the files, if different qualities are being used. A skilled filer knows too when to use oil or chalk to prevent scratching or clogging, and how to care for his files so that they will not become damaged between operations. In short, the good filer, like the violin virtuoso, is indeed a master.

The vise too must be strong and securely mounted at just the right height. The right working height is important in good filing practice. For the average kind of work, the piece to be filed is generally placed at about elbow height. If fine and delicate filing is to be done, the work is placed somewhat higher so as to be on a level with the eye of the filer. Heavy filing, on the other hand, can best be done with the work in a lower position so as to provide a better leverage. The correct pressure on a file varies with different materials, and the skilled filer

learns when and where to exert pressure just as he learns to divide the work between coarse and finer cuts of files.

Together with the proper study and selection of files for the particular purpose for which they are to be used, it occasionally happens that even a carefully selected file must be "prepared" or "refined" to make sure that the tool will be safe to use for the work planned. For instance, it sometimes is necessary to work close to a sharp corner, the wall of which must be left unscratched by the file. To offset the effect of a possible slip due to momentary unsteadiness of the operator, the teeth on the side of the file that will be working against the wall may be ground off, or even polished, leaving a smooth surface at that point of the file. Safe edges on files avoid mis-filing hazards and speed up shaping operations.

Shaping is aided by having files of shapes and cuts especially suitable for the work at hand. As sometimes happens, shape filing is done on mechanisms which, because of their weight and bulk must be so placed that the filer is obliged to work in an uncomfortable position. Here proper illumination is important as an added safeguard against expensive misfiling. Then too, it is difficult to work in awkward positions, in which cases it is more profitable to have the workmen use files that are longer than the work actually demands, ignoring the fact that the unused teeth are being wasted. Such teeth may later be of service when the file is used in some less particular operation.

As already indicated, it is imperative that the right tool be



The CLEVELAND

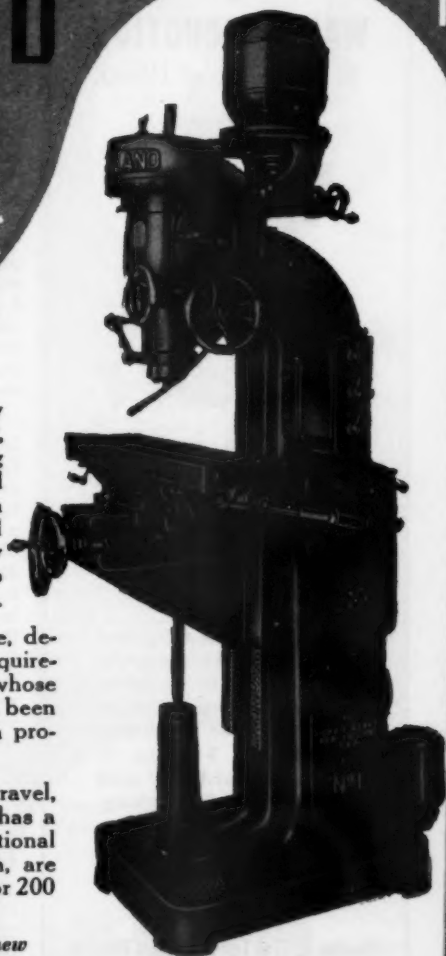
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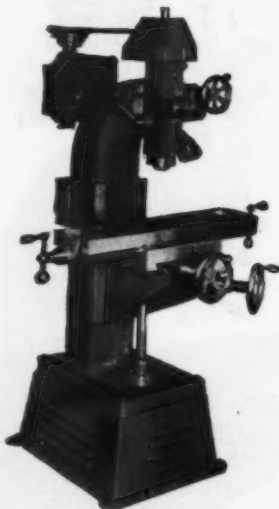


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used in filing as is true in other industrial operations. Just as files with small rectangular sections, such as Pillar files and Square files, are suitable for keyways and narrow spaces, so also, where acute angles are to be filed, one finds the narrow wedge sections of the Knife, Three-Square, or Pippin files very useful. There are many types of files so shaped that they can reach into difficult recesses, examples of which are to be found among a collection of rifiers used by die sinkers, jewelers, silversmiths, sculptors, and instrument makers. Flexible files, fitted in an adjustable holder, such as are commonly used by garages and automobile body repair shops for cleaning up welds before painting, are finding their way into other industrial plants,—machine shops, foundries, railroad shops, and ship yards, where cleaning has difficult obstruction problems.

As different shapes of files have different applications, so different applications demand different styles, angles, and cut of teeth. In lathe filing, for instance, it has been found that with a long angle file, in which the angle of the teeth has been increased from 25 to 45 degrees, there is less tendency for chips to lodge in the teeth, scratching the surface of the metal being filed. Special files have also been developed for use in snagging castings in foundries. These files have extra long rugged teeth which are not so high and sharp as the teeth of regular files. They are designed to take abuse on punishing jobs and rough filing.

Various metals also call for specially designed files, the result of research work on the part of file manufacturers. The widespread use of stainless steel and other alloy steels has created special filing problems in modern industry. The chromium and nickel content of these steels makes them tough and dense, causing an abrasive action that tends to shorten the life of the general

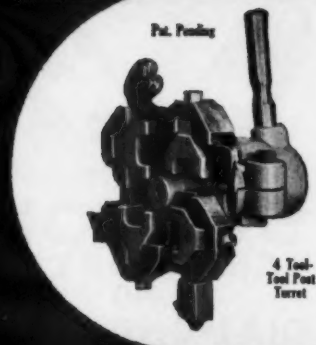
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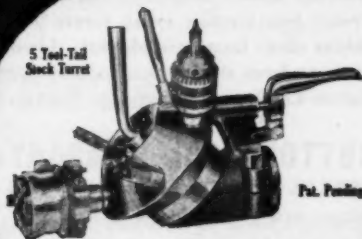
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purpose file. To meet this contingency, a new type of file tooth has been perfected. It might be added, makers of files recommend that stainless steels be filed with a light pressure and a slow, steady stroke to prevent heating of the metal, since, as the steel becomes heated it becomes harder. Aluminum is a soft, ductile, malleable metal, on which any cutting tool has a tendency to build up chips before it, dulling the tool. A special file, for use on aluminum surfaces, has been developed, having a deep upcut and a fine overcut. This fine overcut produces on the upcut a succession of small scallops which break up the filings, enabling the file to clear itself of chips, preventing channeling, clogging, and chattering.

The filing of brass, copper, and similar metals, calls for a special purpose file, one in which a combination of tooth angles and number of tooth points per inch gives better results. Brass is a "greasy" metal, tending to shred easily which, after a few strokes have been taken, is apt to clog up the teeth of a regular file. Here, a suitable combination of angles and teeth prevents the special purpose file from taking too big a bite out of the soft metal and eliminates clogging and chattering.

When it comes to preventing fins, burrs and rough edges from lathe-turned work, ridges on wrench damaged parts, and unwanted protrusions on numberless other pieces,—this work can be done quickly and cheaply with a few strokes of a file. The first rough cleaning of iron castings is usually done with old files. In some plants these older files are distinguished from the newer ones by some form of marking, such as a daub of paint or stain on the wood handle of each, or by dipping the point of the file in a metal paint.

There has been considerable controversy as to whether or not it is profitable to have files resharpened or re-cut. Much, of course, depends on the

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extent of damage or wear to which the files have been exposed, as well as the list of operations about a plant upon which hand files may be used. In plants where it is the custom to route files from one operation to another, or from use on one metal to another, a file may be considered to have served its usefulness by the time it has been discarded at the last operation. For instance, a file might be started on cast iron surfaces that are free from scale. Then, when the highest degree of keenness is gone, it may be routed to free cutting steel or to some other metal. This may be followed by routing the file to rough work on iron castings,—work generally consigned to old files; and finally to the removal of paint from areas that are being prepared for welding or where some repairs are to be made. Such a routing, when systematically carried out, will usually provide files in a sufficient useful state for each operation.

When hand files are to be routed from metal to metal, or operation to operation, in this manner, and the plant is so equipped, a sandblasting treatment may serve to clean and resharpen the teeth, enhancing the value of files having been worn, to greater evenness of teeth. In some cases sandblasting may be repeated two or more times, depending on the condition of the files. When the nature of the work is such as to clog a file, it may be cleaned and resharpened by use of acids, caustics, boiling water, and other baths that will attack the clogging substance without injury to the teeth. In some instances, the chemicals are assisted by electric currents, and, as frequently happens, teeth that have developed glazing are resharpened by this process. Workmen often assist in keeping their files clean by frequently tapping the ends on the bench, shaking loose any filings or chips from the teeth, and by periodic cleaning with a file brush or card. File cards bear much the same relation to files that good stones do to cutting tools. The good lathe hand stones his tools and the good filer cards his files.

(Sketches—Courtesy Delta File Works, Philadelphia.)



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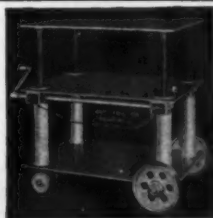
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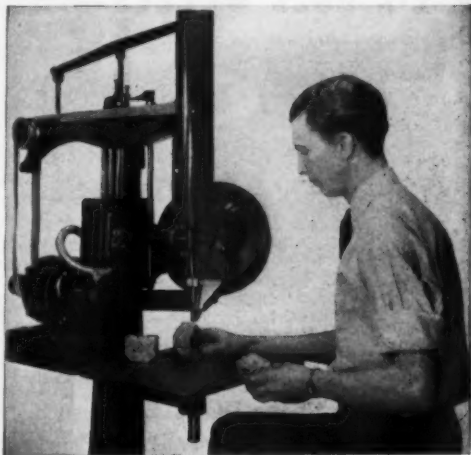
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Automatic Screw Driving

By CARLETON CLEVELAND

WITH war production schedules demanding an ever increasing flow of materials, it is only natural that ways and means are continually being sought to minimize, if not completely eliminate annoying bottle-necks along assembly lines. What could be more vexing than production delays resulting from tedious screw-driving operations. Power, of course, is considered as one solution of the problem, using both magnetic and mechanical screwdriver attachments, or magazine feeds; that is, hopper feeding and power-driving of screws, with equipment such as designed by Detroit Power Screw Driver Co.



Driving screw through cord clamps in switch box assembly.

In this latter type of equipment, the machines have barrel hopper units into which quantities of screws are placed. As the hopper rotates, the screws fall into slots in a collector ring, which in turn discharges each screw into a slotted track, down which they slide to the lower end. An escapement mechanism which is timed with the up-stroke of the spindle, allows one screw at a time to escape and drop into gripping fingers that hold the screw rigidly in line with the screwdriver bit, attached to the end of the drive spindle,

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The entire operation is mechanical, the operator merely placing the assembly into which the screws are to be driven, in a nesting fixture on the table of the machine. Lining up the threaded hole in the assembly with the screw, held securely in the gripping fingers, the operator depresses a treadle, driving the screw into place. Releasing

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the treadle causes spindle to return to its original position, and another screw drops into the grip of the mechanical fingers. The assembly is then moved to the next screw hole, and the screw driven into place. Each operation requires from one to two seconds to accomplish.

The electrical industry was quick to recognize the advantages of such a power-driven automatic-feed screwdriver, and has found they have eliminated lost time due to fumbling of screws on the part of the workers, and made for better relations between workers and foremen because of more efficient work. It was not long before the automotive industry installed its first model, and in quick succession the manufacturers of plumbing equipment, radios, stoves, hardware, telephone, and refrigerating equipment became regular users of this type of screwdriver. And now there are innumerable places in war production where the work can be expedited.



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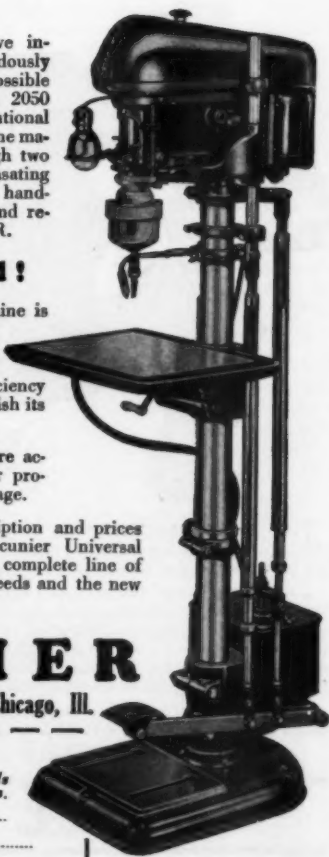
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Reducing Shop Noise

By ERNEST W. FAIR

NOISE in the machine shop generally means decreased production and physical strain upon workers in direct proportion to its intensity and monotony. Many noises cannot be helped. Workers in the shop must adjust themselves to those noises. But there are many noises that can either be lessened in intensity or done away with altogether.

Reduced noise usually means better production, a decrease in waste and spoilage, and an immediate improvement in the morale of the working force. No man's nerves can be expected to remain in balance if his ears must transmit to his nervous system a volume of unnecessary noise every minute he is working on the job.

Most noise can be prevented or reduced at the source and this may be done either by a change in design of the machinery or equipment making the excess noise, or by damping.

Changes in design are beyond the average shop's control but not when replacement of equipment time comes around. For example, almost every year, improvements in electric motors are producing designs with much lower a-c electrical hums than in previous models. When such replacements are made, models should be sought having these improvements and it is often wise to make advance replacements ahead of real need in order to obtain reduction in noise.

Noise can also be quieted by what is known as damping. This involves covering the machine with a suitable damping material that has the ability to reduce vibration.

A layer of non-drying putty 1" or more thick, covered with varnished cambric or similar material to prevent gradual drying of the putty is one method often used to reduce such noise. The putty exerts a powerful damping action, especially on high-frequency whistles and ringing noises. Rumbling noises need less strong damping. The higher the frequency of the noise, the thinner must be the putty.

Felt-like materials, used as lagging, are effective also. They absorb sounds and reduce the ability of a surface to radiate noise. Resinous and tar-like material in similar applications offer friction to slow vibratory deflections.



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A noisy machine may also be screened, confining the noise to a given space immediately about the machine, rather than permitting it to spread throughout the entire shop. It is wiser to subject one employee in a small area to noise (to which a worker might be able to adjust himself to endure) than it is to subject the whole shop to the same noise.

It is also to be noted that small holes or cracks in a wall, otherwise highly resistant to noise, will pass an astonishing volume of sound. Make certain also that such a screen or room has tightly fitting doors; a great deal of sound leakage in the average shop will occur through loose doors. In construction of such a wall or room remember that stiffness of the material is a handicap rather than an aid unless the wall is thick and of small area. A double wall, with air space unbridged by rigid members, may resist noise transmission far more than a single wall of the same total weight per square foot.

A double wall is always more desirable and cheaper at the same time. A comparatively rigid skeleton of 2x4" studding is generally advisable with inner and outer walls hung from it by spring connections. The walls should not weigh more than five pounds per square foot and could weigh a good deal less. A thin layer of plaster-like reinforcement is helpful.

A single wall should be of brick or masonry to have enough mass to be effective.

Studding should be set on a layer of yielding material to prevent transmission to the wall from the ground or other support. A layer of felt under the sill is recommended.

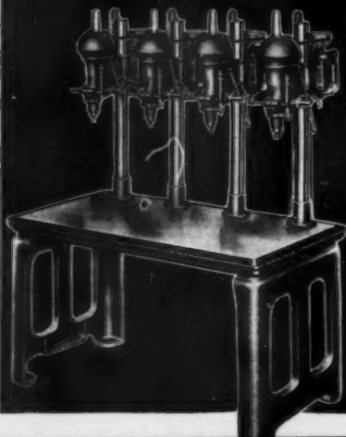
Another source of noise transmission in many shops is along metal pipes that run throughout the shop. This can be reduced by rubber joints to prevent metallic contact of pipe sec-



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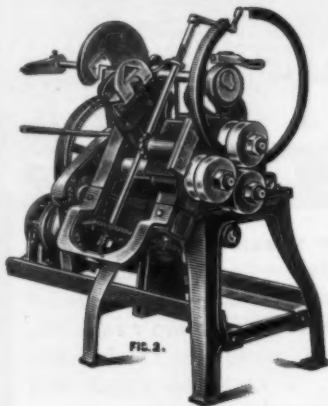
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tions. On air ducts it is generally advisable to use heavy canvas connections.

When noise cannot be screened in the shop or office it can often be taken up by sound absorbing materials. Felt-like materials have high sound absorbing power. So have porous materials. A good absorbant covering has a smooth surface layer of oilcloth or thin metal perforated with many holes, under which is a porous material.

Here, according to one authority, is a list of sound absorbant materials, given in the order of their coefficient values, with the first named having the highest coefficient value!

(1) Acousti-celotex, 414 small holes per sq. ft. (2) Balsam wool, 1" thick, (3) Rock wool, (4) Hairfelt, 1" thick, (5) Curtains with heavy folds, (6) Carpet, (7) Marble, (8) Glass of single thickness, (9) Plaster on lath (10) Varnished wood, (11) Planed wood, (12) Painted brick walls, (13) Plain brick walls.

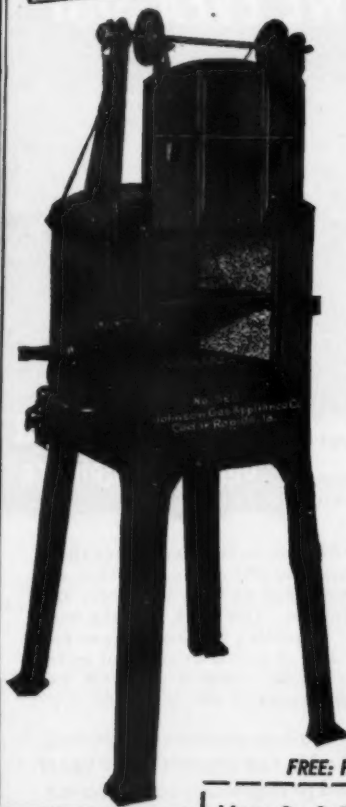
Noise in ventilating ducts can be reduced greatly by linings of acoustic absorbant materials.

While the science of noise reduction in the shop or office is not always so simple as one might be led to believe, nevertheless these pointers offer the main line of procedure toward noise reduction or elimination in the average machine shop or office.

Where the noise problem is not of excessive proportion these hints should suggest suitable procedure; where it offers an engineering problem, it will pay the shop executives to consult an engineer experienced in this type of work.

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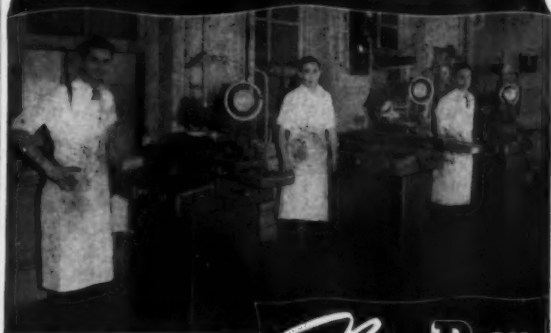


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"Let's Talk Shop!"

Calculating Carbide Tool Performance

By Paul H. Miller, Chief Engineer
Carboloy Company, Inc.

ONE of the most common erroneous beliefs in connection with the adoption of carbide cutting tools to speed production, is that the higher cutting speeds recommended for such tools impose greater forces on the work and tool. Actually, the opposite is the case more frequently than not. Many a shop man has hesitated to use carbide tools for such reasons as:

1. A belief that the increased rate of metal removal will increase the tendency for the work to slip in the chuck, or
2. That it will be necessary to tighten the chuck too much to prevent slipping and thus distort the work
3. A belief that the increased cutting speed will cause long work to "twist up" to a greater extent.
4. That there will be an increased tendency to distort thin wall (hollow) parts, etc., due to increased pressure of tool against work.

The basis of such beliefs is probably the fact that the increased rate of metal removal by the machine, when carbide

tools are used and the machine is speeded up, involves in turn an increase in horsepower required.

Actually, the increase in hp required may be accompanied by a decrease in tool "loads" and torque, as simple basic engineering considerations demonstrate.

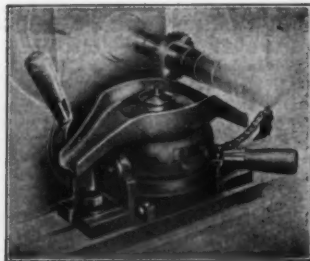
What Determines Tool Load?

For a given tool set-up, tool loads—pressure on the tool and by the tool on the work—are determined by two major factors:—the cross-sectional area of the chip, and the nature of the material being cut. It can be expressed by a simple formula:—

$$\begin{aligned} \text{Total Tool Load (in lbs)} &= (\text{Feed in inches}) \times (\text{Depth of cut in inches}) \\ &\times (\text{a constant depending on the material}) \\ &\times 33000. \end{aligned}$$

The value of the constant (see accompanying table) varies from 6 to 10 for different classes of steel, and from 3 to 5 for different types of cast and malleable irons. For all except the extremely hard bronzes and brasses, the constant is around 3 to 4. For the hard-to-machine non-ferrous metals it may run as high as 10.

Irrespective of the value of this constant, however, it will be noted that the actual "tool load" is to all prac-



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tical purposes independent of cutting speed.

Cutting Torque

To determine the cutting torque, which determines also the amount of twist or the tendency of the work to slip in the chuck, etc., it is necessary only to multiply the tool load figure by the distance of the tool from center of the work.

Again it will be noted that speed has nothing to do with the subject.

Horsepower

The reason more horsepower is required with carbide tools at higher cutting speeds is shown by the simple formula:

$$HP = (\text{Tool Load as given above}) \times (\text{cutting speed in ft. per minute})$$

33000

$$\text{or } HP = (\text{depth of cut in inches}) \times (\text{feed in inches}) \times (\text{Surface feet per minute}) \times (\text{the constant})$$

This formula makes it evident that, even when the tool load is kept constant (that is, the feed and depth of cut are unchanged), the hp required increases whenever the speed is increased.

This is the horsepower required for actual cutting.

To determine the total amount of motor horsepower required by the machine when switching to carbide tools, it is, of course, necessary to add the horsepower lost in driving the machine itself at the higher speeds recommended for carbide cutting tools. This is usually estimated at around 30% of cutting hp.

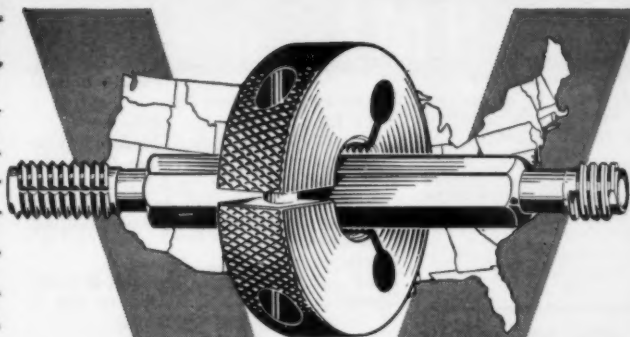
Higher Horsepower with Less Torque

Actually in a great many cases when a job is switched from high speed steel to carbide tooling, the amount of torque and the tool loading are decreased. As a matter of fact, in some cases particularly on extremely large work, it is actually necessary to decrease the tool load to make the carbide tools perform properly.

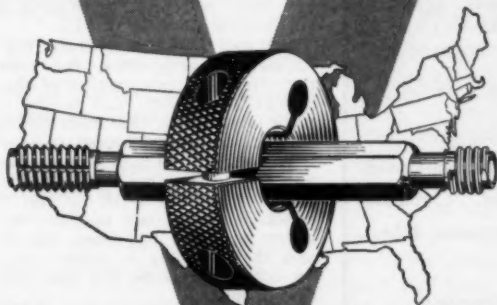
Carbide tools, inherently, cannot take as great a maximum loading (pressure) as can high speed steel tools. On extremely large work where low speeds have been used with deep cuts and

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large feeds, it is sometimes necessary to decrease the feed to prevent tool breakage. This decrease is, of course, more than made up in metal removal by the increased speed at which the cutting is done.

For instance, let us take a typical large job tooled with high speed steel tools with this performance:

OD of work36"
Depth of cut1/2"
Feed3/16"

Maximum Cutting Speed .40 ft per min
(40x12 in/min)

Horsepower required for
for Cutting22 1/2 hp

The amount of metal removed here is 45 cubic inches per minute (1/2x3/16x40x12)

Now when this job is tooled with carbides, let us assume these operating conditions:

Depth of cut1/2"
FeedReduced to 3/32"
SpeedRaised to 125 ft per min

Here is what has happened:

The amount of metal removed is now 70 cubic inches per minute, a gain of 55%. Horsepower required for cutting has been increased to around 35 hp, an increase likewise of 55%.

But tool load, or pressure, has been REDUCED 50% since the feed and therefore the cross-section of the chip, is REDUCED 50%, and torque on the work and chuck has been REDUCED 50% for the same reason.

Thus, while the rate of metal removal and the hp required have gone up, the tendency of the work to slip in the chuck has been cut in half, the tendency to twist has been cut in half and the tendency to distort the work by cutting pressure has also been reduced 50%.

At the same time, finish has been improved by means of the finer feed used, tool life between grinds has been increased due to the harder carbide tools, and the amount of down-time has been decreased in proportion.

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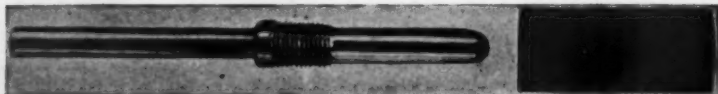
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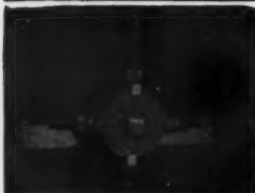
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SAE X1314-X1340	6
SAE T1330-T1350	9
SAE 2015—2320	7
SAE 2330—2350	9
SAE 3115—3130	8
SAE 3135—3450	9
SAE 4130—4820	9
SAE 5120—52100	10
SAE 6115—6195	10
Cast Steel	9
Cast Iron	4
Hard	4
Cast Iron	3
Medium	3
Cast Iron	3
Soft	3
Cast Iron	3
Hard (Alloy)	4
Cast Iron	3
Medium (Alloy)	3
Cast Iron	3
Soft (Alloy)	3
Cast Iron—Up to	3
25 % Semi-Steel	3
Cast Iron—Over	4
25 % Semi-Steel	4
Cast Iron	4
Brake Drums	4
Cast Iron	5
Chilled Rolls	5
Malleable Iron	5
Hard	5
Malleable Iron	4
Medium	4
Malleable Iron	3
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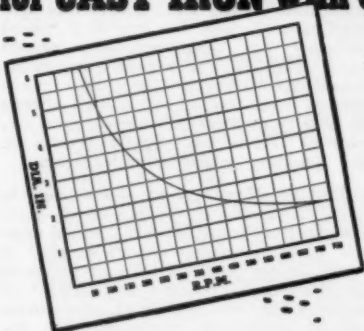
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The specifications of the wheel, in turn, determine its proper speed—surface feet per minute—and a wheel must not be run too fast or too slowly. It must be operated at its correct speed for the job. Grinding wheel authorities agree that—"The life of wheels operating at subnormal speeds may be reduced as much as 40% with consequent reduction in the rate of cutting." The loss of production under this condition can be overcome to some extent by using excessive pressure between wheel and work, but this is done at the expense of proportional increase in the rate of wheel wear.

In service such as encountered with swing frame grinders, the cost of grinding wheels and their rate of wear, even under favorable conditions, plus the penalty of wear at incorrect speeds emphasize the value of multi-speed equipment. The Marschke swing frame grinders, for instance, provide 3-convenient speed changes.

Efficiency of cutting and the resulting rate of grinding is also influenced by the area of contact between wheel and work. In part, this depends on the contour of the work surface as well as upon the size of wheel—also upon the ability to keep wheel and work in uniformly continuous contact. This, of course, is extensively influenced by the "handling" qualities of the swing frame grinder. In "Grinding Wheels and Their Uses" by Johnson Haywood, sponsored by the Grinding Wheel Ass'n, this significant statement is found:

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"Unless machines are kept in good condition, high production at low cost is impossible. Loose bearings or out-of-balance condition in revolving parts set up vibration, which is directly transmitted to the point of contact between work and wheel. The resulting intermittent contact obviously reduces the time the wheel engages in actual grinding and so reduces the rate of material removal. Also, the constantly recurring violent impact between wheel and work tends to crush the face of the wheel and greatly shortens its life. It is common for a wheel in a poorly maintained, vibrating machine to show

only half the economy in production and use of abrasive of an identical wheel on a well maintained, smoothly running machine."

These conditions and requirements emphasize the need for precision fitted bearings and a well designed inflexible spindle. It also explains the need and value of adequate bearing protection against ingress of grit in maintaining true, smooth spindle rotation.

It seems logical to assume that if improper wheel speed can account for as much as 40% loss of production—and improper wheel and work contact can sacrifice up to 50% of anticipated pro-

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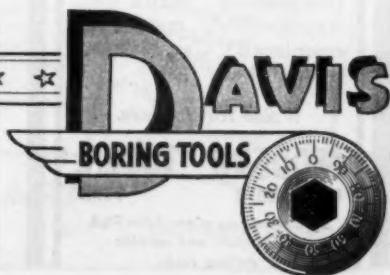
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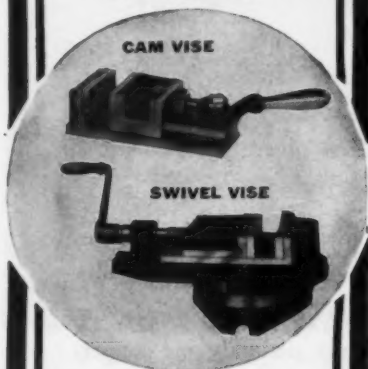
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duction, then the combination of these two deficiencies might well result in providing only about 30% of maximum grinding efficiency.

This conclusion is supported by another statement in "Grinding Wheels and Their Uses" which reads:—The cost of casting and billet grinding varies greatly between shops doing the same work—and even between workmen doing identical work in the same shop. In a steel mill, for example, it was found by test that while average stock removal in billet and ingot grinding was 9 pounds per man hour, the best operator achieved 16.5 pounds per hour, and the poorest only 6 pounds per hour. Here, maximum results were a bit more than 2½ times better than the minimum.

These limited examples are enough to indicate the production possibilities of a good machine in comparison with an inferior one. Considering the cost of wheels and their rate of consumption—even under the most favorable conditions—the folly of selecting an inefficient machine for a minor saving in the purchase price is quite evident. After all, the machine cost is negligible in comparison with wheel costs, and the less efficient the machine, the greater the wheel expense. Considering the high cost of large wheels and the comparatively rapid wheel consumption on tough jobs, makeshift grinding equipment which handicaps wheel performance is a constant source of loss.

These grinding observations are taken, with permission, from a manual issued by Vonnegut Moulder Corp., 1805 Madison Ave., Indianapolis, Ind.



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A new Doall Saw Lubricator—assuring longer saw life, straighter cutting and finer finish is offered by Continental Machines, Inc., Minneapolis, Minn.

The coolant fixture attaches directly on the post above saw guide. A flexible feed line can be directed to apply coolant to the correct position. Since the amount of coolant required is small, a feed control valve is used on the attachment allowing operator to regulate application of coolant to the work.

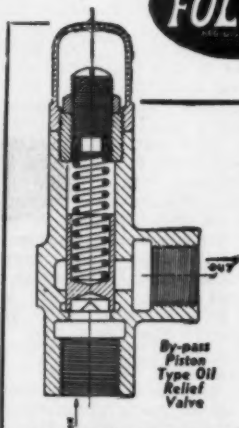


In tests conducted in contour sawing of a large number of materials, it was found that the application of a small amount of a suitable coolant to the saw, directly at the point where saw enters work, greatly extends life of the saw and increases cutting speed. The coolant was found to perform two functions. On steel and other metals having a relatively high tensile strength, coolant prevents the saw teeth from heating as they pass through the work. In sawing of thick sections particularly, it was found that this heating might be sufficient to actually an-

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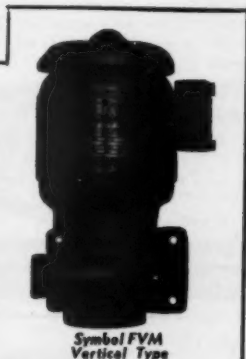
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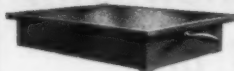


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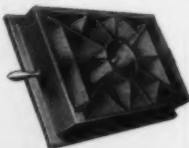


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neal the fine points of the teeth, after which they would, of course, break down rapidly, thus dulling the saw. Application of coolant fed into the kerf of the cut eliminates this possibility.

On metals having a relatively low tensile strength, such as aluminum, copper, leaded brass, zinc, etc., the coolant adequately prevents build-up of the metal on the saw or on sides of the material. This buildup is usually caused by chips compressing themselves between sides of the saw and walls of the saw kerf. This buildup is conducive to saw wear, particularly on sides and back of blade. By the use of a suitable coolant, the tendency to "build up" is reduced to a minimum.

Kerosene, light cutting oil, and soluble oil, have been found to be ideal coolants. Carbon tetrachloride gives slightly better results on some applications due to the fact that its rapid evaporation cools the saw considerably faster than kerosene. The ordinary type of carbon tetrachloride which can be purchased at any hardware store is found to give excellent results. When carbon tetrachloride is used, care should be taken to have proper ventilation to carry off the fumes.

Since the tires used on Doall wheels are made of neoprene synthetic rubber, coolant does not affect the tires, even after continued use. In laboratory tests conducted at the factory, on the use of coolant in contour sawing, it was found that an average of 25% increase in saw life could be expected with use of the proper coolant. In addition, cutting speeds can be increased an average of 10%. In all cases, it was found that addition of coolant to the saw improved the finish obtained. On materials having a low tensile strength, including practically all of the non-ferrous metals, the saw finish obtained with the use of coolant was far superior.

Clamping with Roller Chain

By Paul Grodzinski

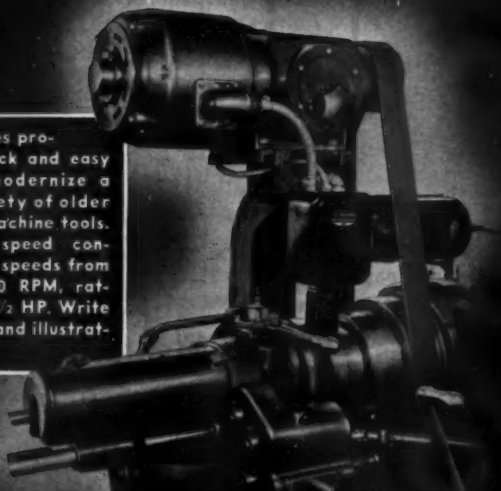
Usually work pieces are held in jigs and fixtures by means of surface friction, so that the pressure exerted for clamping serves only to generate the necessary friction force. Location of

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the work piece by means of projections or locating pins is only possible in certain directions.

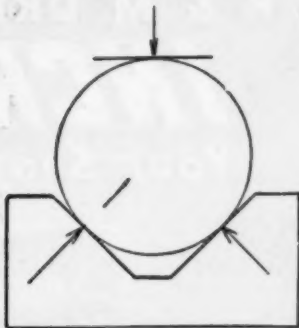


Fig. 1—Scheme for a clamping design for cylindrical work pieces, usual design.

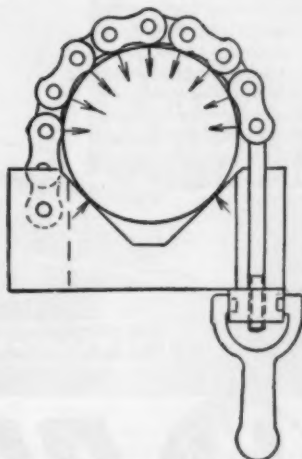


Fig. 2—Clamping of a cylindrical work piece by means of a roller chain.

Clamping by friction improves with the number of places where effective friction forces are acting. As it is not desired to have various clamping elements which are independently actu-

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ated, balancing members are preferred which cause multiple contacting points with work pieces of varying shape.

A clamping element which hitherto has not found the acceptance it deserves but represents an ideal element for these purposes, is the usual roller chain. The advantages of this element become obvious when we compare it with usual clamping means. When clamping a cylindrical work piece in a fixture, usually a prismatic location is used, bringing the center of the work piece in the required position. Further, usually a simple clamping plate for exerting a vertical pressure is applied (Fig. 1). This design causes three contacting points or areas. In comparison with this, a roller chain in connection with a prismatic location, as shown in Fig. 2 provides for 5 to 8 contacting points so that the friction force, resisting rotation of the work piece is increased in a similar ratio. As further, the clamping pressure is distributed on multiple points, the work piece is not likely to be damaged on

points where the clamping pressure acts. Roller chain is tightened by a simple screw drive; the screw having sufficient length to allow clamping of work piece of different diameters. Fig. 3 illustrates further, the application of

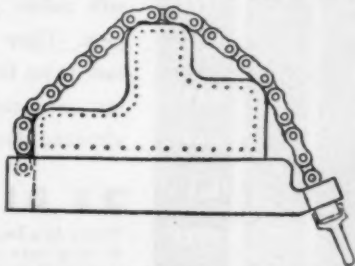
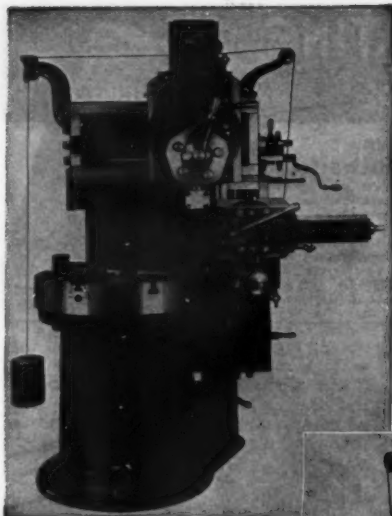


Fig. 3—Clamping of a work piece of irregular shape by means of a roller chain.

roller chain for clamping a work piece of irregular shape. This shows clearly that the clamping design, even for



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(Rear View)

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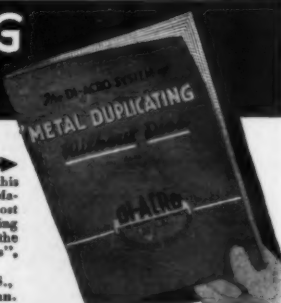
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complicated work pieces becomes very simple and inexpensive when using such clamping elements.

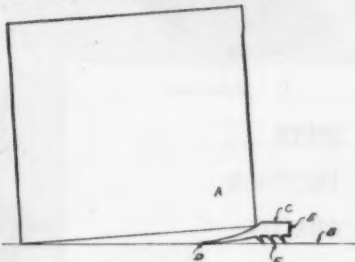
Wedges for Unwieldy Work

By John E. Hyler

Shown in the sketch is a wedge form that may be cut of bar iron with a contour saw, or, if preferred, the body of the wedge may be torchcut and the points welded on. Wedges of this type will start the heaviest and most awkward boxes and heavy work of various kinds from the floor. They have their particular value in the extreme power of a very low starting angle, and the non-slip feature which makes them much safer to use than ordinary types of wedges.

Referring to the sketch, A represents a heavily loaded box, and B the floor line. The wedge C runs out to almost a knife edge at D, and is struck with a sledge at E to drive it under the work. The "teeth" at F, it will be

noted, are pitched in a direction that will cause them to bite into the floor if the wedge begins to slip backward, but they slide readily over the floor when the wedge is driven, because of this very direction or pitch.



Used as shown, a wedge of this type lifts one side of the work sufficiently to allow of easy loading on a hand or electric truck. But it should be noted

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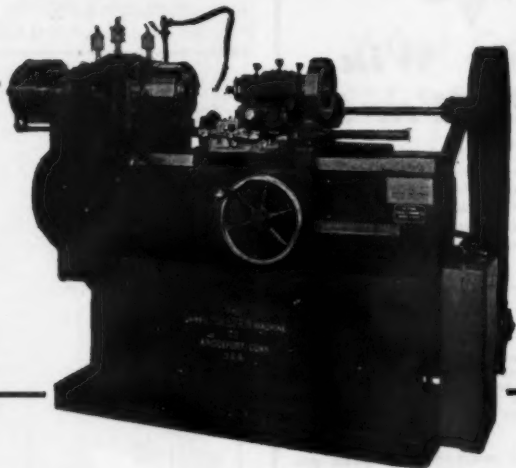


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1. Put one responsible individual in charge of salvage throughout all departments of your plant. Give him authority to start at once an emergency "cleanup" campaign, to be followed with a permanent salvage organization.
2. Devise an effective method of bringing the message of conservation to all employees every day.
3. Build into your plan a program to keep it alive. Don't let initial enthusiasm die as it is so easy to do. This is a task to be followed up continuously.

Do you have a salvage plan that works well? Write about it to Blue Book and we will relay the message to our readers. It is important that we all aid our government in every way possible to win the war.

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Wiregrip Belt Hooks have patented blue aligning cards that hold hooks in exact position—assure uniform tension, and prevent card end waste — every hook is used.

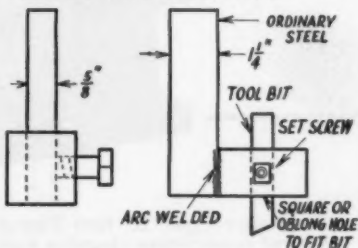
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that if and when desired, four such wedges (two of them under each of two opposed sides of the work) may be used to lift it entirely clear of the floor, so that sling chains may be fished under it in any desired direction. In fishing sling chains under such work, use a hooked rod of sufficient length so that the hands need not be placed under the work at any time.



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A handy shaper tool to use short pieces of tool steel bits has been conceived by W. W. Hughes, Western Machine Works, 666 E. 11th St., Tacoma, Wash. With such a serious shortage of high grade tool steel, this device is very useful now in conserving small pieces of tool steel.

Stock Gear Bulletin

A new bulletin No. 111 of stock gears available for immediate shipment is offered by Brad Foote Gear Works, 1305 S. Cicero Ave., Cicero, Ill. The stock includes spur, bevel, miter, worms and worm gears in practically all sizes and pitches.

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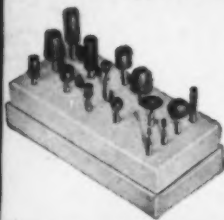
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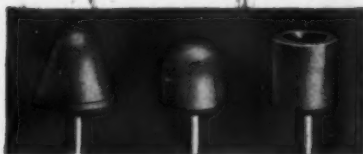
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No. A-4 WHEEL Mounted on $\frac{1}{4}$ " mandrel. **78c**
No. A-21 WHEEL Mounted on $\frac{1}{4}$ " mandrel. **34c**
No. A-38 WHEEL Mounted on $\frac{1}{4}$ " mandrel. **45c**



No. 5900 STEEL CUTTER on $\frac{1}{4}$ " shank **60c**
No. 5904 STEEL CUTTER on $\frac{1}{4}$ " shank **85c**
No. 5910 STEEL CUTTER on $\frac{1}{4}$ " shank **85c**
No. RF-211 STEEL CUTTER on $\frac{1}{4}$ " shank **\$2.50**
No. RF-132 STEEL CUTTER on $\frac{1}{4}$ " shank **\$2.50**

STEEL CUTTER SET No. 3041

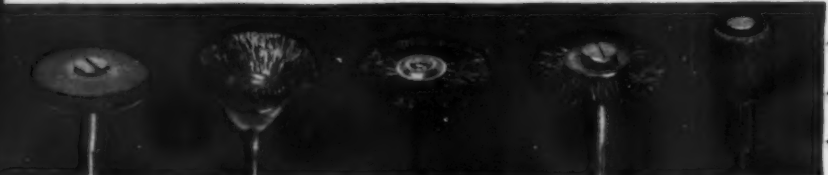
12 selected Cutters mounted on $\frac{1}{8}$ " steel shanks.
\$9.00

No. 3042

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\$27.00



No. 27 SAW— $\frac{1}{4}$ " diam. .023" thick, $\frac{1}{8}$ " hole. Saw only, 75c
No. 28 SAW— $\frac{1}{4}$ " diam. .033" thick. Mounted on shank, 75c
No. 3019 Cutting Disc, of rubber, $1\frac{1}{2}$ " diam. $\frac{1}{8}$ " thick, $\frac{1}{4}$ " hole, 40c
No. 31 Polishing Tip of felt. For intricate work. Without mandrel, 20c
No. 3050 Grinding and Polishing Kit, \$2.00



No. 29 Polishing Wheel. Soft rubber, $\frac{1}{4}$ " diam., $\frac{1}{4}$ " thick, $\frac{1}{4}$ " hole. Without mandrel, 20c
No. 12-S Wire Cup Cleaning Brush on $\frac{1}{8}$ " mandrel, 75c
No. 15 Wire Scratch Brush 1" diam. On $\frac{1}{8}$ " diam. shank, 50c
No. 48 Wire Brush Extra stiff. 1" diam. \$1.00
No. 34 Drum Sander, $\frac{1}{4}$ " x $\frac{1}{2}$ " drum on $\frac{1}{8}$ " shank, 75c

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This remarkable new bond is the talk of the industry, because wheels made from it actually have 150% to 300% longer life than ordinary wheels. Ask for a free wheel to make your own test—you'll be amazed with results.

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Here's a sensitive press in which the DeLuxe Model Handee can be mounted and held firm to drill holes from 1/8" in diameter to the very smallest. Sturdy work table measures 3 1/2" in diameter. Without Handee \$15.50.

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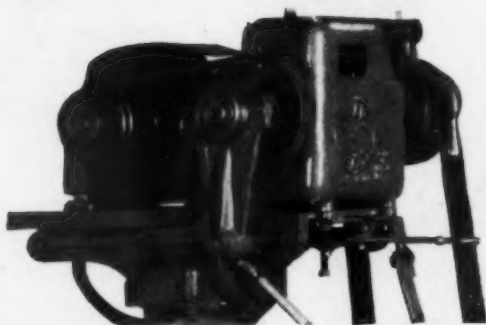
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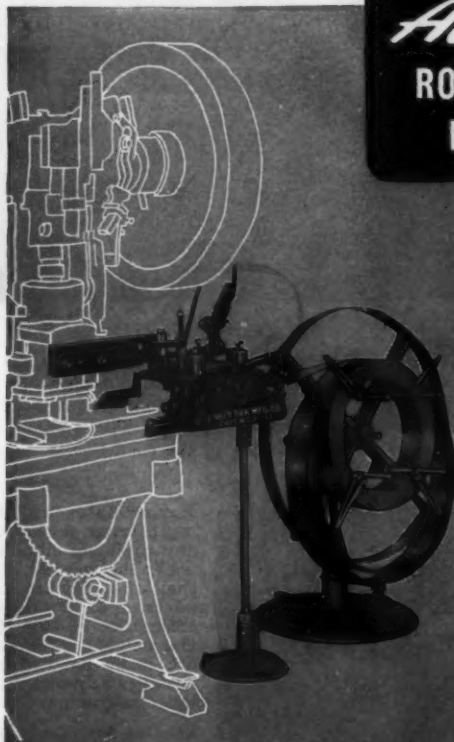
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★ Wittek Automatic Roll Feeds provide an improved and simplified method of punch press operation that insures rapid feeding under all conditions. Made in four different types to meet all automatic feeding requirements.

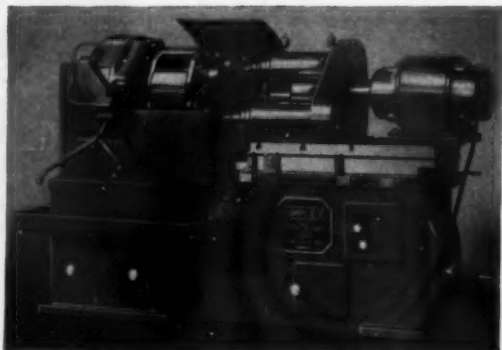
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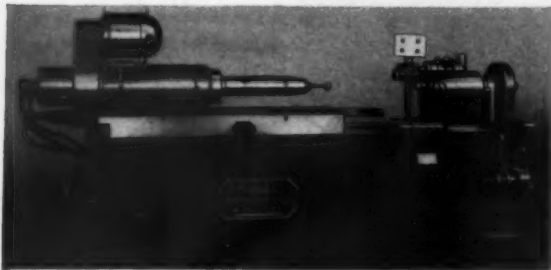
For Speeding Up Shell Production

Simplex Shell Nose Boring Machines . . .

These modern, high production machines face, bore, and chamfer shell noses after the nosing operation and preparatory to threading. The operation is controlled by a fully automatic cycle and production is limited solely by the operator's ability to handle forgings. Production rates up to 100 pieces an hour depending on size (90mm. to 155mm.) and condition of shell body prior to boring have been attained.



Simplex Shell Centering Machines fit directly into the conveyor line that brings the forged shell bodies up to the lathes. The operator rolls the shell on to the work tray, presses the automatic cycle start button, and 30 seconds later rolls the shell back on to the conveyor. That's all. The operation is fully automatic; there is no lifting of the shell bodies.



Production speeds are much faster than with any machines hitherto used, the heavier the shell the greater the advantage. Shells of 155mm. or 6" (130-160 lbs. weight) and down are easily handled by unskilled help with very short instruction.

Simplex Shell Centering Machines are now available for 90, 105 and 155 mm. shells.

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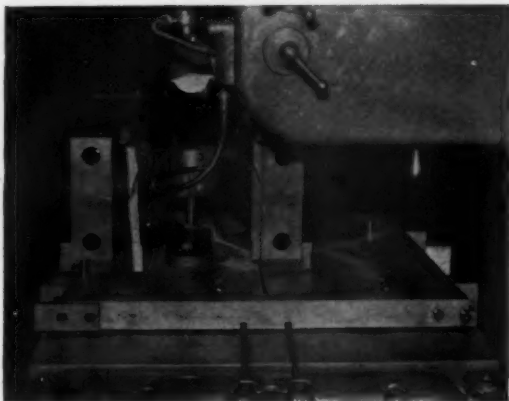


Contour Machining Speeds Marine Engine Production

AS war production commenced getting under way, industry found opportunities to supplement "contour sawing" with "contour machining." The aircraft industry and other well modernized plants were quick to go into action. Batteries of these specialized units are expediting production of many parts, saving tons of material and releasing other tools for other work.

The dual-objective of the contour machining process is to save time and material and it usually works out that way. There are numerous cases where the economy chiefly results from a saving of time, or material. An example of slashing machining time is shown in the accompanying illustrations.

The part being contour-machined is a 310 pound eccentric rod for a 2500



Rear view close-up of sawing operation showing thickness of material removed and pivoting point to generate radius.

hp triple expansion marine engine. Incidentally, this a production job.

This particular operation, clearly shown, had always been one of boring and slotting. Contour machining is said to have reduced the previous time of 7 hours to 1 hour. The saving per piece is no less than \$16 and needless to mention, at least two machine tools have also been relieved of having to make unduly heavy cuts.

The work is positioned and clamped in a fixture, in turn resting on the sub-table of the machine. The cut proceeds straight until it meets the radius. The sub-table is then locked and the fixture swings the radius.



New applications for contour machining are being discovered every day. This economical metal-shaping process deserves serious consideration in defense sub-contract plants to relieve the shortage of basic machine tools.



Angle view showing set-up to contour machine eccentric rods of 2500 H.P. marine engines on a production basis.

New Colonial Broaches

A new standard line of dual-ram broaching machines designated as the VAD series is announced by Colonial Broach Co., 147 Jos. Campau, Detroit. The 11 sizes range from 3 tons and 36" stroke up to 25 tons and 66" stroke. The new machines feature increased size of work tables and ram and increased peak capacities. These machines are especially suitable where extremely high production is required and where one operator can handle feeding and removing a part from one ram while the other is on its down stroke, thus doubling output per operator.

Column widths are greater than in former types, providing better support

for wide broach bars, as well as increasing width of work platen. Vertical mounting of main drive motor within machine, reduces the required amount of floor space.

Construction of receding table mechanism has been improved, permitting installation of chip wipers to protect bearing surfaces of moving platen. New design of table provides a finish machined pad on front for mounting auxiliary units such as cams, etc., for automatically operating clamps, locks and support jacks on fixtures. Provision can be made for clamping work pieces in position in a fixture by utilizing hydraulic system of machine.



Longer travel of recording table has been provided in larger machines. A wider range of applications with increased operator safety is obtained, especially with broaches having deep or irregular contours. Both the Dual Safety Control and Emergency Knee Bar (for quick stops) are supplied on all machines. Operation of rams is continuous with one ram travelling down while the other is returning to starting position.

Chip room and coolant capacity are increased without increasing overall height. All machines are equipped with



PRACTICAL DATA FOR PRESENT PROBLEMS

Here are two books designed to help users of Molybdenum steels and irons to conserve all alloying elements, and possibly steel and iron, by getting the most in the way of strength, toughness and wear resistance with the lowest alloy content.

"MOLYBDENUM IN STEEL" covers the fundamental metallurgy of Molybdenum steels. Heat treatment—physical

properties—applications—of a number of these steels are treated at length.

"MOLYBDENUM IN CAST IRON" covers the effect of Molybdenum in gray iron, giving suggested analyses for practical applications and detailed discussion of high strength (60,000 p.s.i. and up) irons.

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Has considerable power for use as a Straightening Press and Arbor Press.

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heavy-duty, large volume coolant pumps.

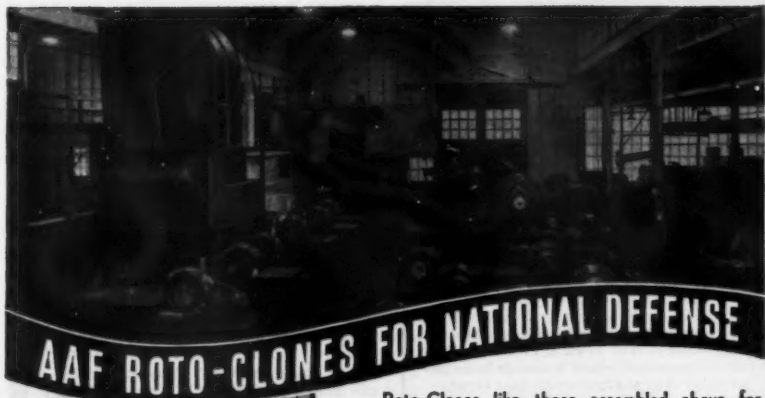
Welded steel construction is utilized for such parts as column and table. The increased use of steel castings in fabrication of the machines combines the flexibility of cast design with the inherent advantages of welded construction.

Semi-Automatic Milling Machine

Clearances for articulated connecting rods are milled in the master rods used in radial aircraft engines, on this new semi-automatic milling machine designed and built by Snyder Tool & Engineering Co., Detroit. Both roughing and finishing are performed on this machine, which will handle either solid or split-type rods. Since the cutting cycle of the machine is automatic, being hydraulically operated and electrically controlled, one unskilled operator can maintain continuous production tending several such machines.



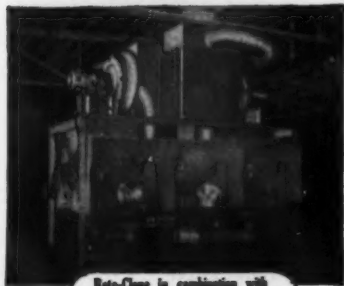
The main bore of the master rod is located on a plug, and a bored and reamed hole for the articulated rod is



AAF ROTO-CLONES FOR NATIONAL DEFENSE



Roto-Clone Grinding Bench with
Aircraft PL after cleaner for
finishing Airplane propellers.



Roto-Clone in combination with
AAF filters thru which cleaned
airs returned to the workroom.

Roto-Clones like those assembled above for shipment to new industrial buildings and foundries, give some idea of the important part that dust control plays in National Defense. In plants where tanks, planes, trucks, guns and shells—in fact wherever the countless defense materials are made—clean air plays a vital role in keeping production lines moving at unprecedented speed.

Men who operate machines must breathe freely of clean, wholesome air, and those machines must be protected from the ravages of abrasive dusts that deteriorate the best of equipment or break down accurately finished surfaces.

American Air is proud of the part it is taking in the National Defense effort—AAF air filtration and dust control equipment delivered to manufacturing plants directly engaged in making war materials comprises approximately 80% of our output.

For more than 20 years the American Air Filter Company has pioneered the development of air filtration and dust control and is today the world's largest manufacturer of equipment to eliminate dust. Bulletins describing the various products are available on request. Please address 312 Central Avenue. Candian companies write Darling Bros., Ltd., Montreal, P. Q.



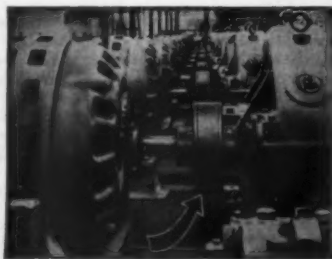
AMERICAN AIR FILTER COMPANY, INC., LOUISVILLE, KY.



RUSH REPAIR JOBS —A WAY TO AVOID THEM

The loss you would suffer in output by being forced to shut down a Productive Machine for repairs would probably be greater today than at any time in your history—why not guard against such shutdowns by using KANTI-LEVER COUPLINGS? They have a Cushion Torque that protects your Productive Machines, your Gears, Motors, Speed Reducers, Bearings, etc. by absorbing the constant vibration and sudden load shocks that cause gradual deterioration and finally shutdowns and rush repairs. They likewise protect you against the evils of shaft misalignment the same as does the ordinary Flexible Coupling. The cut below shows 70 KANTI-LEVERS that have run for 18 years and during that time have paid back their first cost many times over by reduction of repair bills and prevention of shutdowns.

Send for Bulletin 28-B describing
KANTI-LEVER COUPLINGS



BROWN
ENGINEERING CO. 126 N. THIRD ST.
READING, PA.

positioned on an eccentric bushing. The part is then hydraulically clamped by means of a clamping bolt and a C-washer over the hub. The cutting tool is rotated by a vertically adjustable quill-type spindle, which is worm wheel driven. The hydraulically operated eccentric bushing acts as a driver for the path of the cut. A pilot light indicates completion of the machining cycle, and the operator then indexes the part, without unclamping it, for the next cutting cycle.

Truscon Steel Box

A corrugated steel box and platform unit with hinged end door for efficiently handling small forgings, hot or cold, and other small metal parts, has been designed by Pressed Steel Div. of Truscon Steel Co., a subsidiary of Republic Steel Corp., Cleveland, O.

Bottom of box is smooth and of heavy gauge steel, so that when placed on a rack and tilted approximately 20°, parts will flow easily through door opening onto a table or other convenient place. Door is equipped with heavy duty forged hinges, reinforced and riveted in place. A slotted bar on one side of door makes it easy to hold door open as little or as much as desired and so control flow of material from box.



This unit may be used with forked trucks and may be equipped with tiering or crane lugs for efficient storage and handling.

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BONDS AND STAMPS

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REXALLOY has "Superior Red Hardness", and superior toughness. It is a cast, non-ferrous alloy with its basic elements of cobalt, chromium, and tungsten accurately balanced and controlled.

Rexalloy has a very high operating hardness or "Red Hardness". Rexalloy tools are particularly superior when machining metals that generate high heat while being machined, such as stainless steel, manganese steel, tough alloy steel, tough alloy irons, etc.

We recommend the use of as heavy a feed as possible. (2 to 4 times the feed commonly used with carbide tools, and often twice the feed as used with H. S. S. tools.)

HERE ARE THE RECOMMENDED INCREASES IN METAL REMOVAL BY INCREASING SPEEDS AND FEEDS

MATERIAL	% INCREASE IN METAL REMOVAL OVER H. S. S. TOOLS
Cast iron and semi-steel	50 to 200%
Tough alloy irons	100 to 300%
Steel castings	50 to 200%
Tough alloy steel forgings	100 to 400%
Stainless and Manganese steels	100 to 500%

REXALLOY is supplied in only one grade, for all machine work. The best combination of toughness and hardness is incorporated in this grade. A special grade is furnished for wear parts, such as lathe centers, grinder rests, straightening guides, etc.

Note: On roughing work, we recommend that you "dub" or stone off the keen cutting edge at about 45° to the cutting edge. This stoning will eliminate minute chipping of the cutting edge. On very severe work, or on jump cuts, we recommend severe dubbing of the cutting edge. You can stone a "land" at 45° to the cutting edge and the width of this "land" can be from 15 to 25% of the feed per revolution.

Write today for bulletin giving complete details.

GENERAL TOOL AND DIE CORPORATION

62 FRANKLIN ST., EAST ORANGE, N. J.

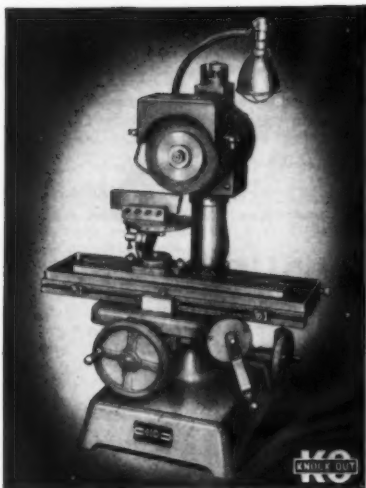
SAVE TIME when 'time is short'



TOOL POST TURRETS FOR ALL LATHE SIZES
Saves on Setting Up — Saves on Repeat Operations

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C-W-C CORPORATION
HAWTHORNE, CALIFORNIA



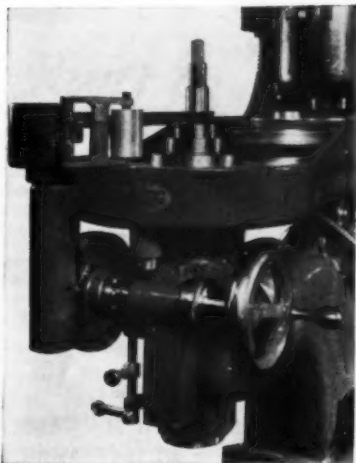
The Model A603 Chip Breaker Grinder is another Knock-Out to add to a long line of fine machine tools. Its 11-inch longitudinal table movement makes it ideal for manufacturing operations. The addition of a tilting table attachment makes it capable of the complete maintenance of carbide-tipped tools.

Write today for CBG42 and PL42-4H

K. O. LEE COMPANY
Aberdeen, South Dakota

Power Feed for Index Mills

Power feed to the spindle is now available for the Index vertical milling machines made by Blank & Buxton Machinery Co., Jackson, Mich.



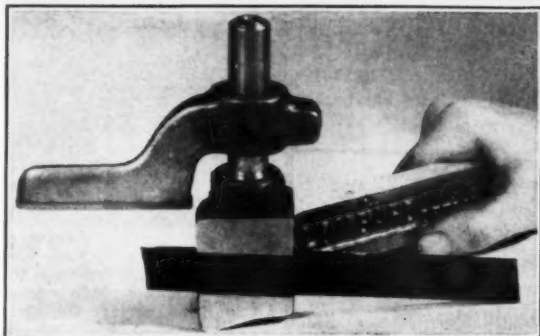
The attachment is designed for mounting at the factory only and will be supplied on new machines where specified. Where the feed is desired for old machines, the heads should be returned to Jackson.

The device provides power feeds to the spindle of .002, .003 and .008" per revolution. It is sturdy and thoroughly in keeping with the rest of this versatile machine tool. Belt tightener roller and vertical shaft run in ball bearings. The makers emphasize that the clutch is easy to throw in, yet will not throw out itself. A dependable stop mechanism provides for boring holes with bottoms.

The head can be set at any angle from 1 to 90° either way. The piece shown in the vise has one hole with counterbore straight through and the other at 45°. Swivel control is obtained by worm and gear mounted at top and rear of column attached to shaft running through column and pinned to head.

NEW TYPE TOOL HOLDER

-- FOR CUTTING OFF IN LATHE --



Steady-Rest Rides Over Work

Holds Tool Steady -- Holds Work Down

**NO DIG
NO LIFT
NO CLIMB
NO CHATTER**

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Different! Operates perfectly on power cross-feed. Safe! Fast! Makes tool cut like cheese! Saves on cut-off tools!

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cores of cold
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SIZES 1/4 HP to 2 HP MOTOR
1 to 2 week deliveries (on most models)

Acme Machines known for their sturdy construction, enjoy wide use in many Defense plants; tested and approved by several engineering groups. Available in Bench, Overhead and Floor Models; Single or Multiple Speed.

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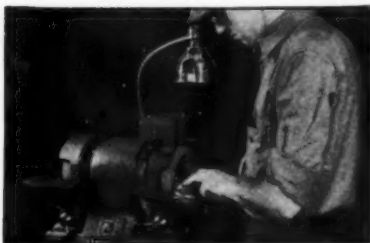
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LARGER SIZES MADE			

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prompt attention!

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NEW YORK



The Index is designed to provide operating speeds high enough for small end mills, and at the same time, sufficiently slow for ordinary jig boring.



Better Light . . . Bigger Output

Vimcolight's value is better realized than ever . . . A-1-A rating . . . 85% going to Machine Tool trade. **New Hammond 6" Carbide Tool Grinder** offers advantages of this "on the spot," non-glare, high intensity lighting . . . adjustable, low in cost. Are your machines **Vimcolighted?** Write for catalog.

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VIMCO MANUFACTURING CO.
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PRECISION WORK CALLS FOR PRECISION VISES

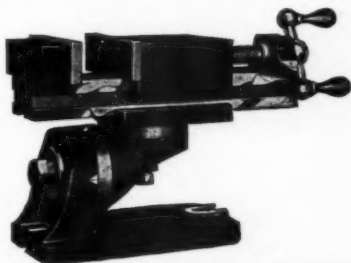
COVEL —

COVEL Precision Vises are designed to meet exacting demands of the present day production program . . . which calls for speed, versatility and performance.

If you're troubled with not having a suitable vise for handling that small job . . . one where several combinations of angles are desired . . . let a COVEL do it for you more accurately and with a great saving in time.



Universal Angle—Style "A" and "B" designed for small work. Especially adapted to hold tungsten carbide tools for reconditioning. Capacities: Style "A"—1¼" square, any length. Style "B"—2½" square, any length.



Horizontal Universal—Style "D" can be locked into any predetermined combination of angles by means of adjustments. Capacity, 4". With jaws removed, 5".

Write, wire or phone for Covell Bulletin MT-42.

C

Grinding Machinery Since 1874

COVEL

INDUSTRIAL
GRINDERS

COVEL MFG. CO., BENTON HARBOR, MICH.

Fellows Straight-Line Gear Generator

This interesting machine incorporates a rack-type cutter, length of which is equal to the pitch circumference of maximum diameter of gear that can be cut on machine.



Fig. 1—Front View of Fellows Straight-Line Gear Generator arranged with foot treadle and hand ejector for manual operation.

In cutting pinions having small numbers of teeth, this particular rack cutter is made in the form of tooth sections separated by gaps, the number of teeth in each group equalling number of teeth in pinion to be cut.

The rack-type cutter holder (Fig. 2) is held in a swivel head set parallel with travel of slide for cutting helical gears. Bed carrying the rack-cutter slide is traversed by a lead screw, and change gears are provided to effect correct linear travel of bed relative to the pitch and rotation of work. Linear travel of bed and position of rack-type cutter relative to work are controlled through a mechanism operated by adjustable dogs (Fig. 3). When lower button on control panel is turned to

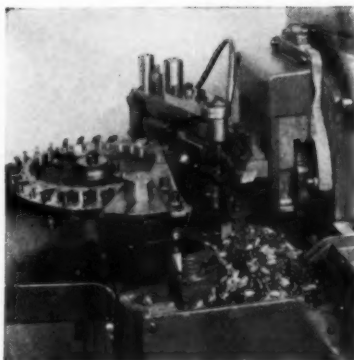


Fig. 2—Close View of machine equipped with work feeding magazine and automatic work ejector.

“hand,” machine stops at end of its predetermined travel and reverses its direction when “start” push button is pushed again. When button is turned to “auto,” reversal occurs automatically and machine will operate continuously until “stop” button is pushed.

Dogs can be set for a short travel of bed, and at any point within maximum travel of bed. For instance, when cutting small pinions with a cutter having several groups of teeth—separated by gaps—dogs are set to use first group of teeth at one end of cutter, and the bed alternately traversed in both directions, a pinion being finished at completion of each traverse.

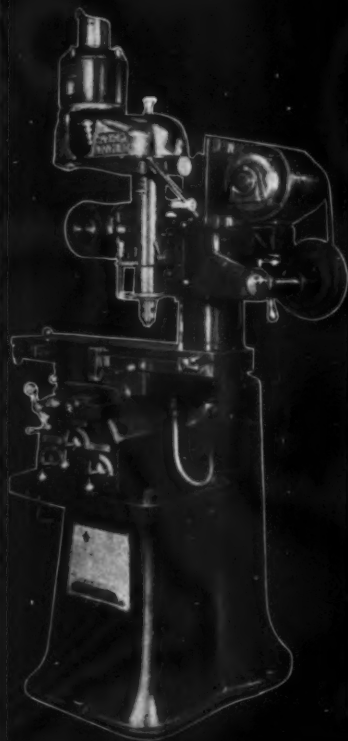
When first group of teeth becomes dull, dogs are shifted until next group of teeth is in cutting position. This procedure is repeated until all groups of teeth are dull, when cutter is removed for resharpening. Since it is not necessary to change center distance between cutter and work when using different groups of teeth, correct size of work can be maintained until cutter has been removed.

Reversal of direction of rotation of lead screw to traverse bed holding cutter, is accomplished through the dogs previously mentioned, which contact micro-switches. These micro-switches

ARMOR

UNIVERSAL TURRET MILL

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Combines Several Machines in One

1. Hydraulic Feed
2. Hand Feed
3. Vertical and Angle Spindle
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5. Three High Spindle Speeds
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8. 16" Vertical Travel
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Entire machine tolerances held
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Write for Complete Detailed Specifications

**WESTLOF TOOL
& DIE COMPANY**

4192 BELLEVUE AVE.
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in turn operate solenoids. The solenoids are connected to electrical control of machine and operate clutches of the face gear type, avoiding use of a reversing-type motor.

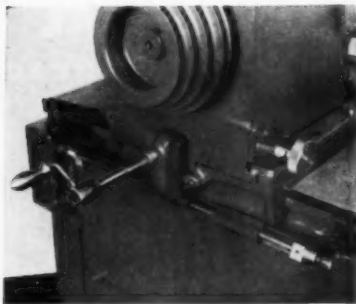


Fig. 3—Rear View showing dogs for controlling traverse of bed and for operating micro-switches.

Electrical control comprises:—a 1/3 hp, 1800 rpm motor, 3 phase, 60 cycles, totally enclosed with a double ended shaft. Power for operation of reciprocating mechanism is taken off from one end of shaft. Feed mechanisms and

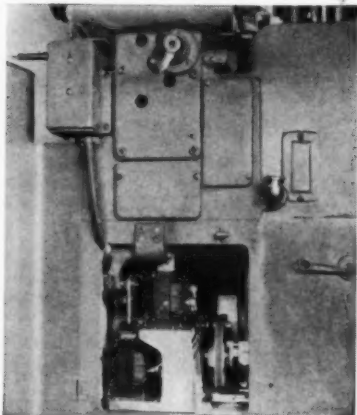


Fig. 4—Close View of Solenoids for operating reversing clutches.

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Our fifty-nine years' experience is behind every Greenerd Arbor Press. There are 65 standard styles and sizes to choose from. Manually operated presses have $\frac{1}{4}$ to 30 tons pressure. Motor driven hydraulic presses have $1\frac{1}{2}$ to 30 tons pressure. There is a style and size to fit your need.

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If you wish our catalog No. F—Write!

GREENERD ARBOR PRESSES

NASHUA

Est. 1883

NEW HAMPSHIRE

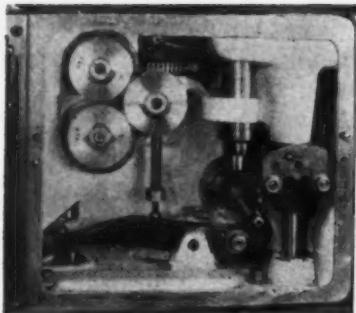


Fig. 5—Close View of mechanism for operating work magazine, work support and work ejecting mechanisms.

compound pump are operated from the other end. Control equipment includes a motor starter, interlocking contactors, transformer, terminal board, push button stations, safety switches, reversing switches, line-fuse block, line fuses, clutch solenoids, and indicating lamp. When machine is arranged for maga-

zine operation, a magazine switch is included.

Another interesting feature is the magazine arrangement for automatically feeding work to work-spindle, and then ejecting it after it has been cut.

One type of magazine, shown in Fig. 2 is provided with 28 stations. Work is transferred from magazine loading station to work-spindle by means of a pick-up arm having fingers that grip work and transfer directly in line with axis of work-spindle, holding it there until arbor support has lowered and clamped work. This arm then withdraws and cutting proceeds. It is not necessary to stop reciprocation of cutter-slide while loading or unloading is being carried on. In other words, the slide reciprocates continuously. In cutting small pinions, as shown in Fig. 2, the loading and unloading is done in the gaps and no time is, therefore, lost. The work, of course, is also ejected automatically through cams, levers and push rods, as shown in Fig. 5. Work-support is operated in a similar manner. This machine is capable of extremely high production, and due to the fact that the rack-type cutter can be very accurately made, real precision results are obtainable.

RECLINABLE POWER PRESSES



We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

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bulletins.

ZEH & HAHNEMANN CO.
Newark, New Jersey

Errington Issues Catalog

An 8 page catalog is announced by Errington Mechanical Laboratory, Stapleton, Staten Island, N. Y. Listed are their complete lines of auto-reverse tapping chucks, drill and tap chucks, self-opening die heads, stud setters, nut and screw drivers, quick change chucks, fixed center multiple drilling and tapping heads, and adjustable spindle drilling heads.

CUTS GRINDING COSTS

$\frac{1}{2}$ — $\frac{3}{4}$ —and MORE



HEAVY DUTY

3 Phase
60 Cycle
No Brushes

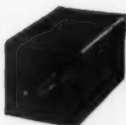
GASTON POWER TOOLS
2655 W. 95th St., Evergreen Pk. Ill.

The SUNNEN PRECISION HONING MACHINE

handles jobs like these faster, more accurately, at lower cost



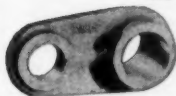
"Strict alignment maintained between two holes."



Saved time in producing a smooth accurate finish on this bronze remote control valve body.



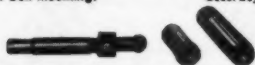
"Produced an extremely accurate and glass-like finish."



Aluminum Aircraft Link "produces high finish without bell-mouthing."



Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.



Airplane Engine Parts accurately honed to a super-smooth finish.



Write for FREE BULLETIN

Giving complete information and showing many examples of use. Or if you prefer, we'll have a sales engineer call and demonstrate this equipment in your plant on your job.

Solve your problems of finishing internal cylindrical surfaces with this inexpensive, yet accurate, honing machine. Relieves big internal grinders for other jobs. Can be set up and work located in a minute. Does not require skilled labor—workers in "teens" can handle jobs in "tenths."

Range .185" to 2.400"—accuracy guaranteed within .0001". Now being used by hundreds of manufacturers handling important war contracts.

Corrects errors of out-of-roundness or taper caused by previous operations. Produces super-smooth finishes. Maintains alignment established by previous operations. Facilitates duplication of sizes.

SUNNEN PRODUCTS COMPANY

7935 Manchester Avenue, St. Louis, Mo.

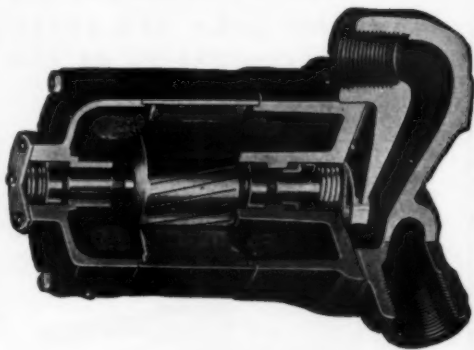
Canadian Factory: Chatham, Ontario

SUNNEN

Brady-Penrod "600" Coolant Pump

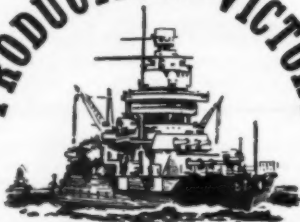
"One Coolant Pump for Every Job" is the claim made by Brady-Penrod, Inc., Muncie, Ind., for its new Model 600. They emphasize that it can be used with any type of coolant in general use, on any type of machine, for single or multiple installations—and can be easily transferred from one machine to another when a job is finished. One pump and tank will handle up to 10 spindles or cutting tools and the flow of coolant can be regulated from a single drop to a steady flow of 1200 gallons per hour.

A glance at the cut-away view of this centrifugal coolant pump shows the design features. The design uses constant velocity vane curvature, a



Venturi impeller inlet and other skilled engineering features that are said to result in hydraulic efficiencies as high as 70%. Francis E. Brady, Jr., the designer, asserts the "600" will deliver

PRODUCTION for VICTORY



WITH a production rate unprecedented in this company's 108 years' existence, we can produce still more if the Nation's needs will be served thereby

**SPECIAL BOLTS, NUTS and STUDS
DIE SINKING and DROP FORGINGS
SCREW MACHINE PRODUCTS • HEAT TREATING
SPRAYED METAL EQUIPMENT**

Estimates gladly submitted. Send samples or blueprints. Catalog on request.

RHODE ISLAND TOOL CO.

148 West River St., Providence, Rhode Island
Serving American Industry Since 1834

RITCO

HALCO Universal Head

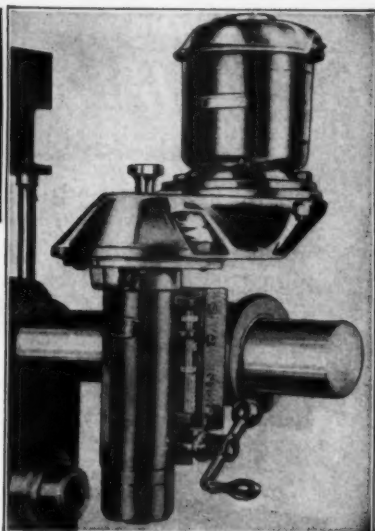
Speed - Accuracy - Dependability

FOR **HIGH SPEED**
MILLING, DRILLING, BORING
AND COUNTER BORING

The Halco Hi-Speed Universal Milling attachment is designed to meet the demand for greater efficiency, better workmanship, and for speed in building tools, dies, jigs, fixtures, wood and metal patterns, and other machine products where accurate and fast machining are of prime importance.

With its 4 inch vertical travel, many drilling, milling, boring and facing operations can be accomplished in one setup. The total weight is approximately 90 pounds, and it can be easily mounted by one man.

The Halco Head is engineered and built to precision limits in a modern shop by skilled mechanics. All parts and materials built into this machine are the very best obtainable and unconditionally guaranteed for six months.



Motor of heavy duty type, $\frac{1}{3}$ H. P., 110 volts, 60 cycle, with plug-in cord and switch. Easily reversible for L. H. cutters. Five speeds 350 to 2900 R. P. M. Also 10 speeds 125 to 2900 R. P. M. available at extra cost.

Prompt Delivery Can Be Made

Sold direct, factory to you, or your nearest dealer. Many machines in use. Tried and tested in machine plants for 2 years. Each head is unconditionally guaranteed for six months.

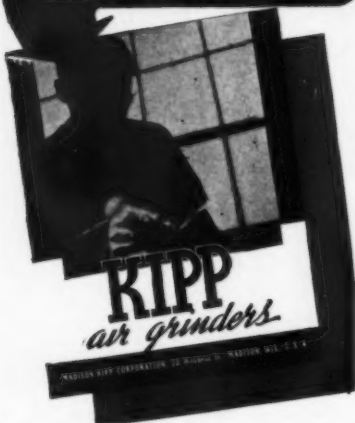
Write for folder giving details or order now for quick delivery.

HALCO PRODUCTS CO.

14230 BIRWOOD AVE.,

DETROIT, MICH.

SEND FOR
FREE CATALOG
JUST OFF THE PRESS



THE Kipp Air Tool Catalog has always been in great demand because it is an "open book" — easy to understand and factual.

The 1942 Catalog now available is to a degree a War issue. One new super model H grinder, for instance, replaces several former models both in the interest of conservation and of better service to industries engaged in war work.

The 1942 Kipp Air Grinder Catalog is yours for the asking.

GRIND **KIPP** WHEELS

AND OTHER TIME-**SAVING** POPULAR AIR TOOL ACCESSORIES

Kipp Air Tools give you highest speeds, lowest prices and have proved indispensable in thousands of test rooms and production departments. Please attach preference rating certificate with order. Model H Grinder sells at \$39.75, Model K \$39.75 and Model PT \$46.75. U.S.A. Price. F.O.B. Madison.

MADISON-KIPP CORPORATION
207 WAUBESA ST., MADISON, WIS., U.S.A.

uninterrupted service 24 hours a day, seven days a week.

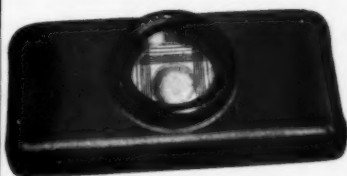
A sturdy motor of full $\frac{1}{2}$ hp capacity is used. Motors are available for all current specifications. Installation is simple. Any shop man can make the installation easily and quickly, at little cost. Pump and sump are set under machine, out of the way.

Mr. Brady is an authority on hydraulic design. For 20 years he was consulting engineer for scores of firms manufacturing or buying coolant pumps. His company offers to ship one Model 600 to any firm in need of coolant pumps, for inspection and 10-day free trial.

Screw Thread Folder

Aircraft Screw Products Co., 47-23 St., Long Island City, N. Y. has just issued a new specification folder of their Aero Screw Thread System, widely used for strengthening threaded fastenings in aluminum alloys and other light metals used in high-speed aircraft engines.

FELL PRECISION LEVEL



A precision "all-way" level for use in machine tool building, setting up and maintenance, whether for establishment of level working surfaces or for the accurate checking of straightness where true level itself is not required.

Graduations are in .0005" per foot and form squares about a circular bubble, thus giving coordinate readings and showing the direction and amount of slope, if any. Made in two sizes— $5\frac{1}{2} \times 12\frac{1}{2}$; $3\frac{1}{2} \times 6\frac{1}{2}$.

Write **TODAY** for bulletin giving full details.

Wm. B. FELL COMPANY
700 South St. Rockford, Ill.

INSPECTION IS
AS IMPORTANT
AS PRODUCTION!

ARE YOU PREPARED TO
MEET PRESENT DAY
ACCURACY DEMANDS?

THE SCHERR LIMITED BUDGET INSPECTION LABORATORY IS DESIGNED TO MEET YOUR INSPECTION NEEDS

Plant conversion and increased production are vital. BUT DON'T OVERLOOK INSPECTION. In sub-contracting particularly is inspection important for if among 35 sub-contractors producing essential parts, only a few HAVE THEIR WORK REJECTED the entire production can be stalled, slowed down, perhaps halted.

THERE IS NO NEED TO TAKE CHANCES ON REJECTIONS. Install this inspection department.

1. THE WILDER PROJECTOR

The Wilder Projector enables you to see exactly where tools, templates, gages, threads, etc. vary from specified dimensions and contours, and how much they are out. Magnifications available from 10x to 100x.

Basic Price.....\$267.50 F.O.B. Waltham

2. A SET OF GAGE BLOCKS

accurate within .000008" is a necessity to provide the basic standard of measurements, from which all production starts and all measuring tools and gages, used throughout the shop are checked and set. There are large and small sets of our Ultra-Chex lines to suit all requirements.

34-block set.....\$125.00 F.O.B. New York

3. SCHERR COMPARITOL

Gives accurate dependable readings in 1/100000". Gage blocks, plug gages, tools are checked for size, tolerance and wear. Mass produced parts such as bearings, pins, bushings, are rapidly checked without dependence upon the skill or "feel" of the operator.

Standard size 0-6".....\$195.00 F.O.B. New York
Heavy-duty 0-8" size.....\$250.00 F.O.B. New York

4. OPTICAL PARALLELS

Required to inspect the surface of gage blocks, lapped surfaces of all kinds and parallelism of micrometer anvils.

Single parallels.....\$10.00
Set of 4 one-half inch thick.....\$85.00
Set of 4 about one-inch thick.....\$90.00

5. REED PRECISION MICROMETERS

1" and 2" in 1/1000" and with vernier to 1/10000".

6. SPENCER BINOCULAR MICROSCOPE

With three dimensional vision reveals scratches, surface finish, imperfections, which cannot be seen with ordinary microscopes showing one plane of vision.....\$153.50

7. ATLANTIC ADJUSTABLE LIMIT SNAP GAGES

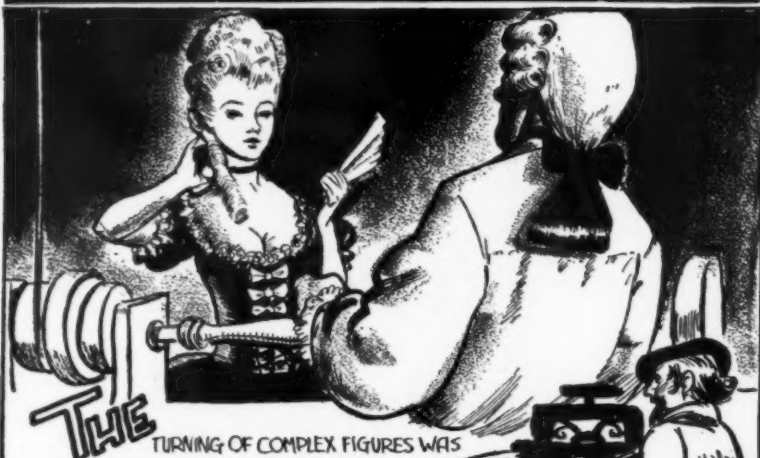
Our snap gages are made to American Gauge Design Standards. Frames are made of MEEHANITE, a special material chosen because it retains its form.

WRITE, WIRE or TELEPHONE CANAL 6-1464 for prompt quotation.

GEORGE SCHERR CO. INC.,

122 LAFAYETTE STREET
NEW YORK, N. Y.

Mechanics Through the Ages



THE

TURNING OF COMPLEX FIGURES WAS

A HOBBY WITH THE FRENCH NOBILITY DURING THE 1700'S. MANY OF THESE NOBLES TURNED THEIR MECHANICAL SKILL TO PROFIT AFTER THEY WERE EXPELLED FROM FRANCE FOLLOWING THE FRENCH REVOLUTION.



IN EDWARD III'S REIGN (1340-88) POTS, PANS AND ROASTING SPITS WERE CLASSED AMONG HIS MAJESTY'S JEWELS!

ALTHOUGH MACHINE TOOL BUILDERS OF THE 1850'S USED IRON AS SPARINGLY AS POSSIBLE IN THE CONSTRUCTION OF THEIR TOOLS, THEY ACTUALLY LAVISHED THE METAL ON SUCH NEEDLESS ORNAMENTATION AS GOTHIC TRACERY, FLUTED DECORATION, FANCY MOULDINGS AND ORNATE SCULPTURE. THEY EVEN EMPLOYED FRESCO PAINTERS TO APPLY GAUDY COLORINGS!



These COULD BE THE STANDARD TOOLS YOU ORDERED *Yesterday*

If prompt delivery of standard cemented-carbide tipped tools is important to you, Carbide Fabricators can meet any of your current demands. Through steadily increasing production volume, complete stocks continue to be maintained—and, when required, delivery can be promised within 24 to 48 hours.

The standard tools now comprising the Carbide Fabricators line meet almost all your needs for turning, boring and facing jobs. Types are available for cutting of non-ferrous materials, cast iron, bronze, etc. and also for steel cutting. A simple "unit cost" method of pricing makes it possible to order the tools in any desired quantity, with no cost penalty being imposed when the smallest orders are filled.

In addition to standard tools, Carbide Fabricators are producing all types of special cemented-carbide tipped cutting tools . . . manufactured to the highest standards of accuracy and quality—and also delivered promptly. Here, in one smoothly-operating organization, is a most dependable source for all of your War Production needs for wear-resistant cutting tools.

Have You Received

. . . your copies of the new catalog of Carbide Fabricators standard tools? It provides the simplest and quickest procedure for selecting and ordering the tools you require in your present-day production. As many catalogs as you need will be supplied without obligation by your nearest Carbide Fabricators representative or will be mailed upon request directly from the factory.

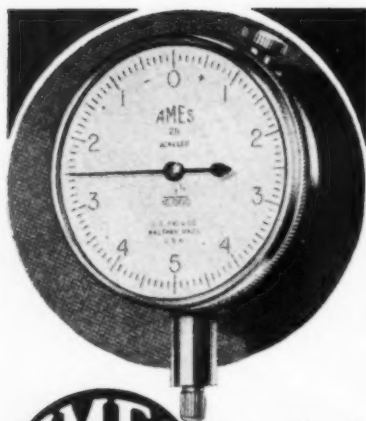
We are Authorized Suppliers of Carboloy, Firthite and Vascloy-Ramet Cemented-Carbides



Carbide Fabricators


BERKLEY
MICHIGAN

DIVISION OF MORSE TOOL COMPANY • DETROIT



AMES *Hundred* DIAL *Series* INDICATORS

Made to American Gauge Design specifications in four sizes with fourteen different dial numberings indicating thousandths, half and tenths of thousandths inches. Plain or jewel bearings. Shock absorbers for all models.

 Send for new catalog
No. 52

B. C. AMES CO.
WALTHAM — MASSACHUSETTS

Douglas Grinder

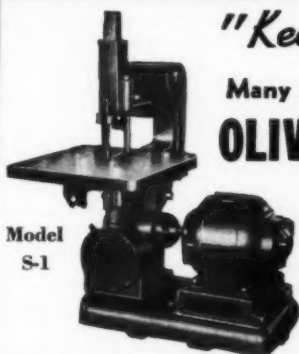
Rotorex, a universal tool and cutter grinder is offered by Douglas Machinery Co., Dept. 805, 150 Broadway, New York City. It is a versatile machine for performing the wide range of tool and cutter grinder operations needed in many plants.



In order to obtain the highest degree of universality, table top has been designed to permit swivelling up to 90° both ways. Surface of the table is provided with a tee slot for lining up and securing headstock, footstocks, and other attachments. Longitudinal table movement is equipped with adjustable friction drag and locking device so as to insure proper table movement and to avoid any idle movement of table.

Spindle head carries the grinding spindle of 1¼" diameter, which is dynamically balanced and mounted on precision bearings with labyrinth seals to exclude grinding dust. A 360° swivel movement of spindle head in conjunction with all other universal feature makes Rotorex capable of grinding any angle desired.

The machine has a 8x15" capacity. Infinitely variable spindle speeds of



Model
S-1

"Keep 'em Flying . . ."

Many Aviation Plants are using numerous
OLIVER DIE MAKING MACHINES

To speed up Defense Output on Dies—
Gages—Cams—Templates—Experimental
Work, etc.

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Savings are large—work is more accurate
—you require less skilled operators.

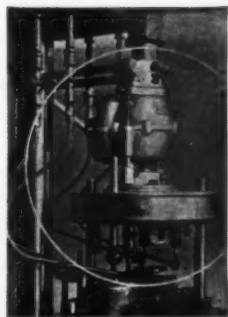
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A real opportunity for saving at a small
investment.

Send for Bulletin Today.

OLIVER INSTRUMENT CO., 1408 Maumee Street, East,
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**Get High Tapping and Drilling Production
right on your drill presses—with**



Ettco-Emrick MULTIPLE HEADS

This exclusive system of **interchangeable** tapping and
drilling heads, **made entirely of stock parts**, assem-
bled to fit specific requirements, is the quick, low-cost
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QUILL CLAMPS are available for attaching heads to
any drill press with absolute rigidity.

GET FULL DETAILS IN BULLETIN No. 3

Copy mailed at your request

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MAKERS
OF

Ettco-Emrick

DRILL CHUCKS • TAP CHUCKS • TAPPING ATTACHMENTS
MULTIPLE TAPPING AND DRILLING HEADS • TAPPING MACHINES

AUTOMATIC THREAD MILLER "Clinton"

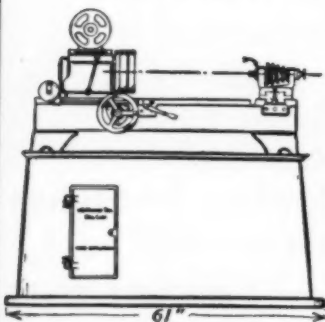
**FOOL-PROOF CUTTING
LEFT AND RIGHT
INTERNAL AND EXTERNAL**

UP TO 7" OUTSIDE DIAMETER

5 to 40 THREADS PER INCH

1 to 5 PITCH METRIC

**on shells and bombs up to
155 mm O. D.**



**Combining Accuracy, Ease
of Operation, Economy, In-
terchangeability of Parts,
Precision, Simplicity With
Low Price and**

2 WEEKS DELIVERY

**U.S. MACHINE TOOL
MFG. CORP.**

100 So. 6th St.

Terre Haute, Ind.

3,000-6,000 rpm are provided. A complete 12 page bulletin describing the machine in detail is available.

Recruiting Continues for Technologists

About a year ago the Federal Civil Service Commission began a recruiting drive for technologists. The number of persons on the employment lists now established is not sufficient for today's wartime needs. Accordingly, the Commission has recently reissued the announcement of these opportunities for Government employment with slightly modified requirements. Salaries for the positions range from \$2,000 to \$5,600 a year. Applications may be filed until further notice with the Commission's Washington Office.

By technologist the Commission means a person experienced in "the necessary production, engineering, and scientific research work essential for the successful operation of an industrial plant, where such plant operation is based upon a thorough and expert knowledge of a branch of an applied science," such as explosives, fuels, plastics, rubber, minerals, or textiles.

For the Junior positions (\$2,000 a year), applicants will no longer have to take a written test, and, as before, no written test will be given for the higher positions. The maximum age limit for all the grades has been raised to 60 years.

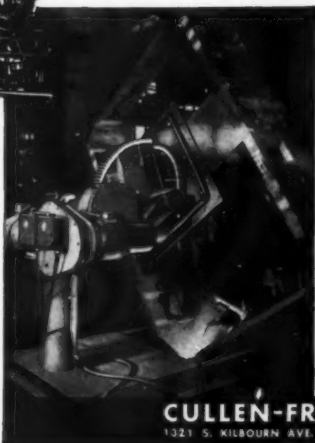
Copies of the announcement (No. 188), and forms for applying, may be obtained at first- and second-class post offices, or from the Civil Service Commission, Washington, D. C.

Fisher Bulletin

A new bulletin has just been issued by Fisher Tool Co., 226 Lafayette St., New York City. It describes their line of high speed drills, files, hack saw blades, angle and surface plates, end mills, lathe chucks, lathe attachments, dividing heads, Keller power hack saws, Johnson band saws, vertical milling attachments, reamers, taps, dies, vises, special taps and dies, etchers, live centers, polishing lathes, and hydraulic arbor presses.



CUTS TIME IN HALF WELDING LOCOMOTIVE FRAMES



● In transportation, as in every other essential industry the need is for more and more production. We **must** hurry. If you can make things **faster** you can make **more** things. C-F Welding Positioners speed up welding production because they cut down handling time and increase welding time. They permit "down-hand" welding at every point with just one set-up, positioning top, bottom and sides with push-button control. C-F Positioners may be **your** best way to speed up the welding production schedule.

Write for Bulletin WP 20.

CULLEN-FRIESTEDT CO.,

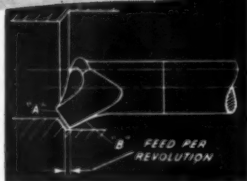
1321 S. KILBOURN AVE.

CHICAGO, ILLINOIS

***Bokum Boring Tools
always retain their
free cutting action***

The angle of the cutting edge and the special helical backed-off form of the front of the tool (A and B) produce a free-cutting action that is constantly retained — even through resharpening.

The greatest cutting force is always directed towards the largest cross section of the cutting tool, consequently, the tool can stand much more feed than can the ordinary boring tools. In spite of the increased feed, the tool will not shatter, because the material removed is not taken squarely at right-angles but a favorable slant that produces a smooth bore, true to size.



For speed, economy, accuracy, and efficiency, you'll use Bokum Boring and Internal Threading Precision Tools.

Send for Catalog No. H1139.

Available also Carbide Tipped. Ask for Catalog No. H398.

BOKUM TOOL CO.,

**49 W. HANCOCK AVE.
DETROIT, MICH.**

Federal Pitch Diameter and Wall Thickness Gages

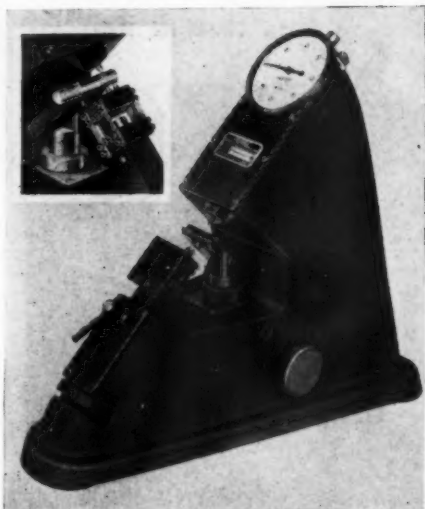
With so much work being done on British as well as American war material, the Model 45B-80 pitch diameter gage made by Federal Products Corp., Providence, R. I. is becoming especially important, since it is adjustable for inspecting both types of threads.

The two lower ball locating points are free to adjust themselves laterally, independent of any variation in lead. The distance between these two points can be adjusted for different thread sizes, and the lower unit is adjustable to take various thread diameters.

The backstop is adjustable 3 ways — vertically, laterally, and angularly, making possible setting it accurately back of the work, and also so as to allow for heads, shoulders and other obstructions.

Inspection to within .0002" is possible, according to the makers. Capacity is up to 2", and it is graduated in .0001 or .0005".

Another Federal inspection gage, important in war work is the KP.-96 es-



pecially designed for inspection of wall thicknesses of 500 lb. demolition bombs. This same type of gage, however, can be furnished for bombs of other sizes as well as for torpedo tubes.

The gage is light for its size and is readily portable from bomb case to bomb case. It is graduated to .001" with a range to 1". It is made in any size to suit requirements.

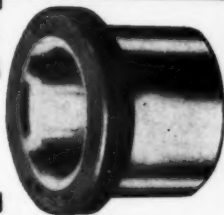
Baldor Develops Chargers

Baldor announces a line of industrial type chargers. They have been designed particularly for charging large batteries as used in industrial electric trucks.

The chargers are made in two sizes — 40 amperes and 80 amperes. Models for charging either lead cells or Edison cells are available. The chargers can be purchased for manual operation or complete with controls for automatic operation. Address Baldor Electric Co., 4368 Duncan Ave., St. Louis, Mo., for bulletin No. 314.



**ACME BUSHINGS
MAKE AMERICAN
PRODUCTION
MORE DEADLY
TO JAP!**



★ Here's good news for defense contractors (bad news for the axis). You spend less time and money tooling up for special work by using Acme Standard Drill Jig Bushings.

For, in addition to the A.S.A. (American Standards Ass'n.) Standard, a wider range of lengths and outside diameters are included in the Acme Standard line (see red listings in Acme's catalog). If your particular requirements are not listed, count on Acme precision manufacture and prompt service.

TOOL ROOM—PRODUCTION SUPT.:
We are specialists in flat lapping for measuring instruments and seating surfaces. Let us refinish your worn snap-gauge and comparator anvils or tables to true flatness.

Acme Advice is Yours for the Asking!



ACME INDUSTRIAL COMPANY

Makers of Hardened and Ground Precision Parts

210 N. Laflin St., Chicago, Ill., MONroe 4122

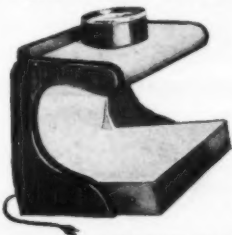
**COMPLETE WITH
TRANSFORMERS,
FLUORESCENT TUBES
STARTER, 6 FOOT CORD
and SWITCH**

INSPECTOGRAPH

**WIDTH: 11½ in.
HEIGHT: 12 in.
DEPTH: 10 in.
LENS DIAM.: 4 in.**

FOR FINE AND ACCURATE WORK FOR INSPECTION OF FINISHED PARTS

Regardless of the type of overhead lighting used in modern shops it is impossible to eliminate shadows and glare. For this purpose the Inspectograph was designed. A soft diffused fluorescent light was so inclosed as to be concentrated solely upon the object, thus barring all outside light which normally varies a great deal. A large lens was added to speed up inspection and to reduce unnecessary eye strain.



The Inspectograph's great range of adaptability and application makes it an item of necessity which no concern, whether large or small, can overlook. A better quality of work alone is enough to justify its use.

**JUST A FEW OF THE MANY
USES FOR THE
INSPECTOGRAPH
IN MACHINE & TOOL SHOPS:**

Finding cracks, scratches and tool marks on dies. Working on small punches. Inspecting bearing surfaces.

Sharpening tool bits, drills, reamers and milling cutters. Accurate micrometer reading. Inspecting screw machine products, gun parts, gauges, taps, castings.

FULLY GUARANTEED

MODEL B. DOUBLE BULB, \$26.40 each, NET.

SCHULTZ & ANDERSON CO.,

**109A EDISON PLACE,
NEWARK, N. J.**

**Machinists—Tool & Die Makers—Sheet Metal Men—Pattern Makers—Get...
FREE SAMPLE TAMMS BLUE LAYOUT DOPE**

Speeds layout time on brass, aluminum, copper, tin, stainless steel. Won't chip, crack, or flake off. Comes in handy 8 oz. bench type brush-in cans. Also pts., qts., gals., drums.

Tamms Silica Co.
228 N. LaSalle St., Chicago, Ill.



Eastern Coolant Pumps

A new model No. 17 coolant pump is announced by Eastern Engineering Co., 42 Fox St., New Haven, Conn. Its special features include an open impeller that allows small chips or grit to pass through the pump without harm, an exceedingly compact design, and the elimination of any stuffing box which does away with leakage at this point, saves power and requires no adjustments.



Sizes 19 $\frac{1}{4}$ " and 16 $\frac{1}{4}$ " high are available (the latter is shown). It is said that there is no metal to make contact below the liquid level, permitting con-

tinuous handling of non-lubricating liquids. Maximum pressure is 6 lbs. per sq. in. and maximum capacity 17 gals. per min. Three different type pump mounting are available—flange, bracket, and pump.

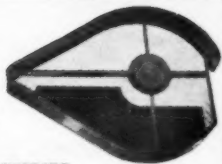
Rust Inhibitor for Black Iron

The Watson-Standard Co., Pittsburgh, Pa., announces development of a new organic coating for black iron which they claim can be applied very economically at the steel mill and will result in the solution of many of the coating man's problems. It is used as a protective coating in lieu of the oil previously used on the metal.

This new product is of the oxidizing type. It is said to provide an effective protection against corrosion and serves as a prime coat for all types of synthetic and oleo-resinous coatings. It will withstand the usual tests and should be a boon to those who have formerly used tin plate.

**GEAR AND BELT GUARDS
FOR INCREASED PROTECTION IN
YOUR SHOP**

Gear and Belt Guards of all descriptions
Built to Order to your specifications for all
types and makes of machine tools. We
will be glad to send full particulars.



PROMPT DELIVERIES.

PENN TOOL & MACHINE COMPANY
100 Pennsylvania Ave. - Corry, Pennsylvania

Dust

With labor shortage being one of the great bottlenecks in war production effort, it is vitally important that shop conditions do nothing to bring about lost time.

A recent survey of Conn. industry showed that almost half of all plants were potentially dangerous producers of dust diseases, silicosis being the most dangerous.

Factors determining potential danger of dust are its composition, quantity or concentration, particle size, and duration to exposure.

There are several methods of determining dust concentration—based upon averages for a period of a half hour or so, and upon grab samples. If results of an average sampling period show concentration to be high, then a grab sampling is usually advisable to determine which operations are contributing most of the dust. The instrument taking the grab sample may be used to advantage later for control purposes after the effectiveness of the original testing has been carried through.

Both types of instrument count the number of particles per cubic foot of air, the terms in which dust concentrations are usually expressed. Since large dust particles are unable to get

into the lungs because of the air straining process on the way to the lungs, only particles less than 10 microns are included in counts.

Investigation has shown that only a small percentage of dust particles in industrial atmospheres exceed 3 microns in size, altho larger particles are found near grinding and other operations. These remain in the air for a short time only.

(Courtesy Conn. Gen. Life Insurance Co.)

Rotorex

UNIVERSAL TOOL & CUTTER GRINDER FOR ALL KINDS OF TOOLS

Cylindrical
Internal
Tap & Surface
Grinding

Quick Delivery
by
Large Scale
Production

Capacity
8" x 15"



DOUGLAS MACHINERY CO., INC.

150 BROADWAY, NEW YORK, N. Y., Dept. 805



This Acousti-Booth gives you a "Zone of Quiet"

Noise in busy factories often causes production delays due to errors in phoned orders. You can avoid this by installing easy-to-use Burgess Acousti-Booths for your factory phones.

Sound absorbing walls—Patented sound absorbing interior of the booth soaks up factory noise and leaves a zone of quiet for telephoning. This booth has no doors because it needs none.

No priorities needed—Rigidly constructed of heavy reinforced plywood, it uses no restricted material. Easy to keep clean—no maintenance. Send for illustrated bulletin and prices.

Mail Coupon for Free Booklet

Burgess Battery Company, Acoustic Division
2817-D W. Roscoe Street, Chicago

Please send illustrated booklet describing the Burgess Doorless Acousti-Booth and how it works.

Name

Firm Name

Street-City

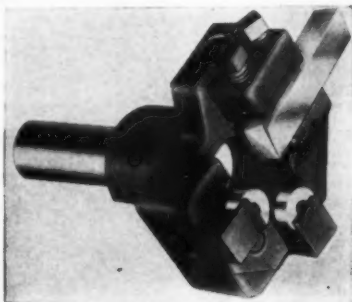
Operating under Burgess Patents

BURGESS ACOUSTI-BOOTH

Boyar-Schultz Box Tools

A new line of box tools for hand screw machines and automatic screw machines has been developed by Boyar-Schultz Corp., 2108 Walnut St., Chicago. Three sizes designated as 00, 0 and 2 are offered and other models are expected to follow.

Simple in design, the new tools are easy to set up and adjust. For re-grinding, the tool bit can be removed from the holder, ground, returned and set in the right position in minimum time.



Bodies are of forged alloy steel, heat treated for strength and wear. Rollers are of dense, hard, wear-resisting tool steel. Roller blocks are made in two different heights. They are accurately threaded for sensitive adjustment.

Tool bit holder is heat treated. Bit is always tangent to the work. Front rake is correct for most work. A positive screw feed adjustment permits quick setting up. Roller block wedge tightens and releases both roller blocks with a single movement. New bulletins give full details.

Speed Indicator Bulletin

Bulletin G-427 has just been issued by Reeves Pulley Co., Columbus, Ind. describing their electric remote speed indicator for use with Reeves variable speed control equipment. Eight large pictures graphically show it and its use in work.

Electrons

Loose electrons which float around between the atoms of solid iron and its alloys are responsible for many of the properties of these alloys, said Dr. Roman Smoluchowski, General Electric Research Laboratory physicist, in speaking before the American Physical Society recently.

He presented a new conception of the role which these free electrons play. Applied in practice, it may lead metallurgists to a better understanding of what happens when other elements are added to iron, making the alloys so important to industry, both in peace and in war.

Atoms of iron, like others, consist largely of electrons, each carrying a negative electrical charge, encircling a positively charged nucleus. These atoms are arranged in a lattice formation, making up the metallic crystals. But also in iron, as in all metals which are electrical conductors, there are other electrons floating around in this lattice, not connected to any particular atoms. The drift of these so-called free electrons is responsible for the conduction of electricity as well as of heat.

SLOTMASTER eliminates many costly set-ups and hand operations

A slotting head that can be used on milling machines provides double duty facilities at a minimum of cost. It requires but little time to change-over from one head to the other and back again . . . The stroke of the ram is adjustable from 0 to 4" . . . the speeds range from 50 to 250 spm . . . The tool



Above: Cutting keyways on compound angles

Below: SLOTMASTER installed on a round overarm milling machine.



holder, of the clapper-box type, can be turned in any position . . . All of the working parts are of tool steel heat treated and ground to close tolerances . . . SLOTMASTER comes with pulleys, motor, belt and with mounting adaptable to round overarm or other milling machines.

Send for 4-page catalog and give the specifications of the milling machines that you wish to equip.

EXPERIMENTAL TOOL & DIE CO.

12607 Greiner Detroit, Mich.

However, when iron is heated there is a change at the temperature of 900 C (1650 F). It then goes from the normal alpha phase to the gamma phase. Here the atoms are more closely packed than in the alpha phase and the whole metal contracts slightly. If the heating is continued, at 1400 C (2550 F) the metal changes back to the alpha phase, which is retained until it melts, at 1535 C (2800F).

**POINTS TO...
REMEMBER**

**THE
KNURLED
POINTS
OF**

Reg. U.S. Pat. Off.

UNBRAKO

**Self - Locking Set
Screws are victors
over vibration.**

THEY dig in for the duration . . . stay put . . . and won't shake loose. Just tighten as usual . . . no extra pressure required. Can be used again and again.

*Write today for
Descriptive Literature.*

STANDARD PRESSED STEEL CO.

BOX 606

JENKINTOWN, PENNA.

Cleaning Hard-to-get-at Welds

A new power-driven end brush which should be useful on war production is announced by The Osborn Mfg. Co., Brush Div., Hamilton Ave., Cleveland, Ohio.

It is designed particularly to facilitate the cleaning of slag, scale, or oxidation from welds on inside corners, as well as other locations which are difficult of access.

By making it possible to clean such work as thoroughly and quickly as welds which are readily accessible, this new metal-cleaning tool permits still faster output of products by use of modern welding which is being used so extensively in war production.



The brush can be used in all standard power tools, whether air or electric. This facility is permitted by the special holder which has the additional advantage of permitting instant replacement of the brush part.

The brush proper measures only $\frac{1}{2}$ " across the end, or brushing surface, and may be had with any one of three diameters of wire:—.025" for Type No. 91-S-2 brush, .035" for Type No. 91-S-3 and .090" for Type No. 91-S-4.

Sub-Contract Tests

The 6,000 small metal working plants in the Chicago area be used as testing grounds for a new War Production Board plan to utilize full capacity of little industry for the war effort.

Donald M. Nelson, war production czar, gave his approval to the subcontracting plan last night, it was learned. The plan, applying revolutionary technique to provide small plant managers with full data on jobs which prime contractors are attempting to farm out, will be announced soon.

WPB and manufacturers' officials handling the new plan are expected to designate Chicago as the prime laboratory for the test and Kansas City as the secondary test area.

One informed official pointed out that the 6,000 small metal working plants in the greater Chicago area represent nearly 25 per cent of the number and capacity of such firms in the U. S.

The scheme, he said, is to apply the new subcontracting idea in the Chicago area with all possible speed, maintaining a simultaneous check to observe its results. If it is successful, the plan will be applied on a nationwide basis.

It was understood that the Illinois Manufacturers' Ass'n is co-operating completely with the WPB in the plan




FASTER SPOT WELDING Makes up for Man Shortage

Faster spot welding with Ace Spot Welders is providing many manufacturers with greater production per man-hour and increasing weekly output. Ease of operation makes it possible to develop expert operators quickly.

Ace Welders are production tools designed for today's needs for steady, fast output. They are made in a wide range of capacities, in both manual and automatic motor-driven types.

Write for Catalog 40

PIER EQUIPMENT MFG. CO.
1436 MILTOLA STREET, BENTON HARBOR, MICH.

PEER
ACE  **WELDERS**

and will be instrumental in making the tests.

If the plan develops successfully in the major tests, it would mean that virtually every little metal working plant in the Chicago area will hold subcontracts for war production in the next few weeks, officials said. Then the plan can be expanded nationally.



THEY SATISFY

For both hand and machine sawing, for all kinds of metal, "LENOX" HACKS and BAND SAWS are giving full satisfaction. For results that satisfy insist on LENOX. Sold by Distributors everywhere.



LENOX

HACK SAWS BAND SAWS

**AMERICAN SAW & MFG. CO.
SPRINGFIELD, MASS.**

"The Blade in the Plaid Box"

Wartime Efforts to Keynote Forum

Recent developments in increased speed and accuracy of machine tools will be discussed at the 1942 Westinghouse Machine Tool Forum to be held at the East Pittsburgh works April 6-7. Technical progress as well as stepped-up production resulting from the war emergency pressure embracing new ideas and practices will be pooled for the benefit of all at this meeting.

Now an established annual event, the Forum will be the seventh meeting sponsored by the Westinghouse Electric & Mfg. Co. Machine tool engineers, representatives of machine tool user companies and executives from 78 machine tool manufacturers will discuss problems resulting from the all-out wartime production schedule.

With the ever-increasing demand on time, the Forum will attempt to cover in two days the program normally planned for three. Despite this curtailment, about 10 papers will be presented with ample time allotted to discussions.

Handy Flux Chart

The tremendous importance of fluxes has gradually become recognized by men concerned with welding, brazing and soldering metals.

Long ago the theory of "one flux for all purposes" was disputed. Both scientific experiments and practical experience showed that joining certain metals presented different chemical and metallurgical problems from joining others. Consequently, a large number of fluxes were developed, each particularly suited to a given application.

Naturally, selection of the particular flux which will produce a dependable bond on the job at hand is most important . . . and frequently difficult. The new Krembs Chart is valuable to anyone doing welding, brazing or soldering. It gives quick answers to over 400 fluxing questions, and at the same time, is practical and easy to use. It is based on 75 years of experience in solving metal joining problems. Metal working concerns may obtain complimentary copies by writing on their letterheads to Krembs & Co., 669 West Ohio St., Chicago.

Sabotage

"How can I make my plant sabotage-proof?" is a question being asked many times today. As the nation swings into greater war production work and as the war goes into its secondary stages, the threats of sabotage will multiply.

Of course, there is no definite answer on how to sabotage - proof your plant. But the Federal Bureau of Investigation has offered a four point program of general suggestions to help you.

1. Install all protective devices necessary to safeguard vulnerable points.

2. Establish an efficient guard system.

3. Keep important documents and blue - prints in a safe place.

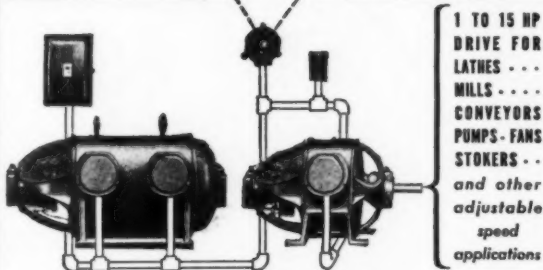
4. And most important—know your employees.

"Caution your employees to be alert, to avoid conversation with strangers, and impress upon them the fact that they have a stake in this country."

Many examples of carelessness in guarding important documents were discovered in a recent survey by intelligence units of the War and Navy Departments. One agent found a vault, built to hold valuable secret papers, which had a practically bomb-proof door, but a rear wall consisting merely of a plate glass window.

Another agent while visiting a war production plant, noticed a factory

10-TO-1 SPEED RANGE FROM A-C POWER



Here's the new, low-cost way to get adjustable speed, constant torque drive from a-c power. The Westinghouse Adjustable Speed A-C Drive provides instant speed adjustment from 175 rpm to 1,750 rpm for continuous operation—slower speeds for starting or setup. No exciters, clutches or complicated control. Push button starts or stops the drive—a single rheostat controls the speed. Nothing else to buy. Write for bulletin DD-4063, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Dept. 7-N.

J-21171

Westinghouse

A-C ADJUSTABLE-SPEED DRIVE



guard could not open the safe without looking at the wall above. Upon examination, the agent found the wall marked with figures revealing combination of the safe. The guard explained he couldn't remember the numbers, so he wrote on the wall.

The Federal Bureau of Investigation particularly warns about using amateur detective work in suspected sabotage cases. In case of doubt, call your nearest FBI office—there are 55 throughout the country.

INDUSTRY ANSWERS THE CALL!



**32,145 FIRMS WITH MORE THAN 17,700,000
EMPLOYEES HAVE INSTALLED THE
PAY-ROLL SAVINGS PLAN**

Have YOU Started the Pay-Roll Savings Plan in YOUR Company?

Like a strong, healthy wind, the Pay-Roll Savings Plan is sweeping America! Already more than 32,145 firms, large and small, have adopted the Plan, with a total of over seventeen million employees—and the number is swelling hourly.

But time is short! The best and quickest way to raise urgently needed billions of dollars is by giving every American wage earner a chance to participate in the regular, systematic purchase of Defense Bonds.

Do your part by installing the Pay-Roll Savings Plan now.

For full facts and samples of free literature, write Treasury Department, Section C, 709 Twelfth St., NW., Washington, D. C.

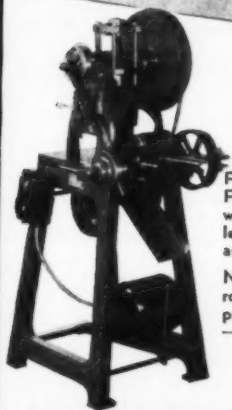


MAKE EVERY PAY DAY... BOND DAY

This space is a contribution to Victory by

HITCHCOCK PUBLISHING CO., 508 So. Dearborn St., Chicago, Ill.

U. S. Defense BONDS ★ STAMPS



★ automatic ★ **DIEBEL** *Hi 500 RPM* **Speed** **PRESS**

Fast—economical accurate stamping. Feed can be engaged or disengaged without stopping press. Maximum feed length 6", width 4½". Strip punching as convenient as coil stock.

No adjustment of tension on feed rollers necessary. Stock guides are provided. Standard speeds 190—370—500 strokes per minute.

Rating approx. 4½ tons.
Weight approx. 500 lbs.

Good Delivery — Phone, Wire, Write
Today for complete information.



DIEBEL DIE & MFG. CO.

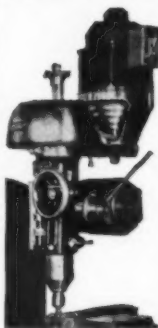
3654 LINCOLN AVE.

CHICAGO, ILL.



To give the Japs a warm welcome, arc welders are at work 24 hours a day in a Canadian munitions plant, producing 3" smoke shells. Operation involves joining a welded steel tube to a steel forged smoke shell base. (Courtesy Hobart Bros., Troy, O.)

MILLING - DRILLING - BORING ATTACHMENT



for Heavy Duty Operations

Uses many types of cutters on a wide range of work. 1/16" to 3/4" end mills.

FEATURES

Large size spindle with No. 9 B&S Taper. Large Quill Diameter with a travel of 4". Furnished with 1/2 h.p. motor.

The aluminum pulleys provide a range of six speeds, from 250 to 3000 R.P.M. The spindle takes 1/16" to 3/4" end

mills. Quill is counterbalanced and hardened and ground. Overarm brackets equipped with spreader screw for easy mounting.

PROMPT DELIVERY

Send for Descriptive Folder.

RUSNOK TOOL WORKS
1845 W. Carroll Ave. Chicago, Ill.

Keep 'em  Turning

Flexoid

INDUSTRIAL Couplings



Write for
complete information

With the THERMOID
HARDY Flexible discs
that aid in elimi-
nating wear and
tear on the driving
units.

DEALERS IN PRINCIPAL
CITIES CARRY STOCKS FOR
IMMEDIATE SHIPMENT.

FLEXOID COUPLING CO., Div.
THE SMITH POWER TRANSMISSION CO.
1545 E. 23rd Street Cleveland, Ohio

Fellows Gear Finishing Machines

Fellows Gear Shaper Co., Springfield, Vt., announce 2 new gear finishing machines designated as Nos. 12 and 24. The No. 12 machine shown is of extremely compact and rigid design, and is arranged with complete electrical control. It is operated through push buttons located at front, controlling rotation of tool in both directions, as well as reciprocation of tool.



Tool is advanced into work by feed cam, and standard cam is so arranged that tool makes 2 complete cycles and then stops automatically. Push buttons are included for controlling direction of rotation of tool. Stroke length of reciprocating tool slide is controlled through dogs and micro-switches, and safety switches are included to stop machine automatically in case of failure of the other units. A timing switch is included to govern period of "dwell" at ends of stroke where reversal of direction of finishing tool takes place.

The No. 24 differs slightly in design, but is provided with similar electrical control apparatus, and is "push but-



Angle Plates, Surface Plates, Lapping Plates, Vee Blocks,
Finished Cast or Steel Plates. *Prompt Delivery.*

TATRA TOOL CO.
16317 Sanford Ave. - Cleveland, O.

MAKE SPRINGS in a jiffy!



with
**Blaner
Universal
Hand
SPRING
WINDER**

Here's a profitable tool room unit. Quickly makes hundreds of sizes of springs. Sturdy, dependable... a real time and money-saver.

Illustrated is No. 4 Universal with adjusting shaft of $\frac{3}{8}$ " square. Takes wire up to $\frac{1}{4}$ " diam.

Patent No.
2052443

Write for your
Circular.

THE JOHN BLANER CO.
Corner Meek & Elm, Sharon, Pa.

ton" operated. On both machines, work is supported on "live" centers held in adjustable head and tailstocks. The table carrying head and tailstocks is adjustably mounted on base so that taper in gears can be corrected. Capacities are:—No. 12, maximum pitch diameter 12", face width 3", 6" diametral pitch. No. 24 machine, maximum pitch diameter 24", 5" face width, 4" diametral pitch.

High Tensile Strength Solder

A special solder developed for the soldering of all hard-to-solder metals such as aluminum, aluminum alloys, die cast, Dowmetal, Alnico, etc., is offered by the Lloyd S. Johnson Co., 2241 Indiana Ave., Chicago. The material is described as exceptionally free-flowing, providing unusual tensile strength in sheet metals and extruded aluminum. It retains color of aluminum and Dowmetal, and is corrosion resistant. Solder comes conveniently rolled $\frac{1}{8}$ " square and runs approximately 270" to the pound.

For LONGER LIFE from your TUNGSTEN-CARBIDE TOOLS USE CARBOIL

The genuine Diamond - Lapping Compound that contains no abrasive and may be used on both composition and metal backed diamond wheels. If your jobber cannot supply you, order direct from

CARBIDE TOOL ENGINEERING COMPANY
333 North Michigan Ave., Chicago, Ill.

The "VIC" PUNCH



Equally efficient as hand or bench punch. Knee plus toggle joint action gives maximum power. Strips without changing position of hands. Hands are protected from sharp edges and pinching. Movable parts in barrel are of steel and replaceable. Price \$15 complete with set of six punches and dies up to $5/16$ ". Bench stand \$3.50 extra. Fully guaranteed.

Wm. BALL, Sr., Hope Manor, West Chester, Pa.
(Peace-time maker of BALL BRASSES—For the duration, "all out" on tools for victory.)



Bids on Speed Instead of Price

A move of far reaching effect on sub-contract work was made on March 4 when Donald Nelson of the War Production Board ordered all military supply contracts to be placed by negotiation instead of competitive bidding, with speed rather than price the deciding factor.

This is also expected to help many

sub-contractors in obtaining war orders. Under competitive bidding, large concerns which already hold extensive war contracts are often able to underbid small manufacturers who are not doing any war work at all. When this happens the contract ordinarily was given to the low bidder, even though he may have a large backlog of orders already. The sub-contractor who is able to start working almost immediately will be given the order, other things also being equal.

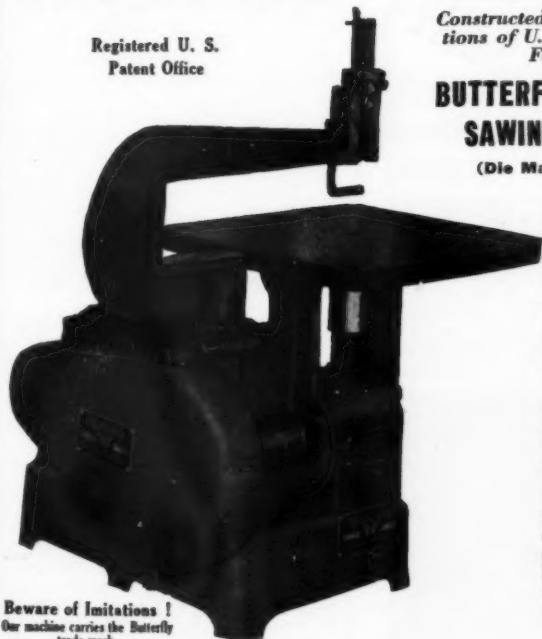
MODEL NO. 16 "SPECIAL"

Registered U. S.
Patent Office

Constructed as per Specifications of U.S. Naval Aircraft Factories.

BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)



Beware of Imitations !
Our machine carries the Butterfly
trade mark.

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D-10⁸ Table; Model No. L-12⁸ Table.

HARVEY MANUFACTURING CORP.

161 GRAND ST.,

Phone CAnal 6-5170

NEW YORK

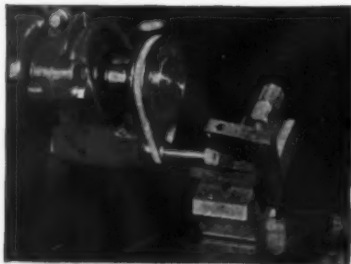


THE New LIBERTY

HIGH SPEED GRINDING ATTACHMENT

Designed for quick, simplified setups for the best results in tool-room, die shops, and grinding rooms. Excellent for grinding gages, angles, slots, recesses and surfaces.

The Liberty High Speed Grinding Attachment eliminates needless time wasted in set up on surface grinders, as it takes but a few minutes to attach.



LIBERTY TOOL & GAGE

225 GEORGIA AVE. **WORKS** PROVIDENCE, R. I.

Detroit Tap Reconditioner

Designed to alleviate current difficulties in obtaining the vast numbers of precision ground taps required for war production needs, a Tap Reconditioner is announced by Detroit Tap & Tool Co., 8432 Butler St., Detroit.



Combining in one unit, facilities for chamfering, spiral pointing and point polishing, the Reconditioner is designed to simplify reconditioning of taps.

It is said to reduce tapping costs by increasing the output per tap during its useful life.

The chamfering unit, located at the left of machine, is of the precision collet type. It will accommodate collets from the smallest machine screw size up to the 1 1/4" standard tap shank size.

Taps of from 2 to 7 flutes may be handled through provision of an indexing drum, indexing being accomplished by pulling dual purpose control lever sideways to release spring plunger. Proper index for different numbers of flutes is selected by moving drum assembly in or out until the number corresponding to the number of flutes

LIMA Electric MOTORS



A complete line of Ball Bearing equipped Squirrel Cage type Industrial motors, built to NEMA specifications in sizes from $\frac{1}{2}$ to 75 H. P.

Consider removable stators and end bells, making the internal parts easily accessible for repairs; dynamically balanced rotors to eliminate vibrations and shock. Interchangeable parts; all important items to the maintenance department of your plant.

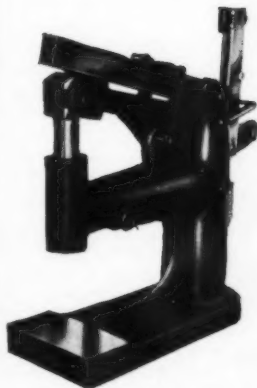
Write today for additional data.
PROMPT DELIVERIES

THE LIMA ELECTRIC MOTOR COMPANY, LIMA, OHIO
Offices - New York - Detroit - Chicago

~~S-P-E-E-D~~ PRODUCTION

AUTOMATIC

STAKING MACHINE



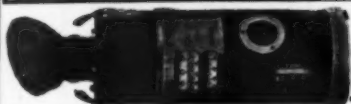
SPEED DEFENSE PRODUCTION—Ideal for staking and riveting when absolute accuracy and uniformity is required. Hammer strikes uniform blow at all times. Variation in thickness of material does not affect riveting pressure. Tools are held in position same as on a punch press. Work is held in place by a pad, and blow is struck on staking tool. Weight of blow is adjustable and is constant after setting. Machine available in three sizes. Write for illustrated folder.

WEBER MACHINE CORP.

61 RUTTER ST.

ROCHESTER, N. Y.

PYRO THE SIMPLIFIED OPTICAL PYROMETER



Unique construction enables operators to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

THE PYROMETER INSTRUMENT CO.
102-103 Lafayette St., New York, N. Y.

DIAMONDS for Defense

**BIG-HEAD-NIBS
LOC-KEY-SET
RE-SET-ABLE**



Cooler dressing
Closer tolerances
Micrometer Accuracy

Because: Wingkey
heat dissipation
and absolute dia-
mond lock nib.

• Three grades of diamonds. Common quality \$12 per karat. Medium quality \$24 per karat. Select quality \$48 per karat. (Contour template diamonds supplied only in Medium and Select quality.)

All diamond sizes 1/4 to 10 karat are nib mounted for immediate shipment... Billed subject to approval. Specify quality of diamond wanted. We recommend a minimum size of one karat for each 6" diameter of grinding wheel. (24 hour resetting service, \$1.00 post paid.) Grinders instruction card free.

DIAMOND TOOL COMPANY, Not Inc.
935 E. 41st Street CHICAGO, ILL.

appears in an inspection aperture. Graduations are provided for adjustment to desired chamfering angle.

Safety stop pins limit movement of chamfering unit for taps of different numbers of flutes. A manual type diamond dresser is provided for chamfering wheel. Hand-wheel adjustment for wear of wheels is provided by mounting entire grinder assembly on sturdy ground rails.

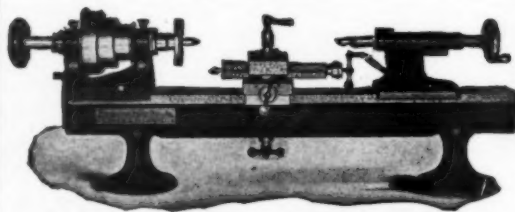
The oversize grinder motor, of the double-end shaft type, is of dust-proof construction and mounted on ball bearings.

The spiral pointing unit to the right employs a saucer type wheel, and its fixture is designed to accommodate taps from the smallest machine screw to 1/2" diameter, using the same precision chuck.

Any desired angle of spiral point may be ground by setting unit according to graduations on support housing. Taps of 2, 3 or 4 flutes may be spiral pointed. To index tap, a trigger is pulled back and the fixture rotates to the next flute position of the interchangeable index discs.

Correct depth and hook desired in spiral pointing is obtained by means of simple manual vertical and horizontal feed adjustments. A safety stop to limit angular swing of unit is provided.

A separate polishing unit for spiral points, etc., is provided at top of machine base, operated by a separate motor and fitted with a cone-shaped wheel.



WADE Bench Lathes

Economical, accurate, enduring for turning, drilling, threading, grinding, milling and screw machine operations.

Wade Tool Co.
Waltham, Mass.

Sub-Contracts

A group of small machine shops and manufacturers in Calif. have shown that small shops can make a large contribution to the war production effort, as well as obtaining considerable sub-contract work for themselves.

The plan has been approved by both the Department of Justice and the War Production Board. The idea could well be applied by other local groups in other parts of the country. The general idea is:—

1. Each manufacturer holds one share of stock and has one vote regardless of the size of his plant.
2. When the group is planning a bid on an item, the pool buys the blueprints and makes the specifications; each member bids competitively on that part of the contract which he can perform.
3. Every participating member must post a performance bond with the pool—not with the government, covering his part of the work.
4. The pool adds a small reasonable group profit to the individual bids in arriving at a total bid to be submitted to the government. The pool profit is divided equally among the members, since the members allow themselves a reasonable profit in their original bid.
5. Books and records are always open to government inspection, as are the group's meetings.



KEEP IT FLOWING... Keeps 'em Going

—and keeping 'em going has never been more important than it is today. Gits Oil Cups and Lubricating Devices, of every description, are answering the Call of the Colors with a proved-in-service reputation established thru more than 30 years of service to industry. Catalog No. 60, gives you 172 pages of answers to lubricating problems.

GITS BROS. MFG. CO.

1860 South Kilbourn Ave.

Chicago, Ill.

30 years of oil cup experience

6. Any member who refuses to participate may be removed from membership by a two-thirds vote.
7. Membership in the group is open to qualified firms on approval of the group. A careful investigation is made of applicant's reputation for work, performance, and financial responsibility.
8. No one may belong to the group who is not an actual manufacturer. No payment of any kind will be made to anyone claiming to have influence or to be able to help obtain contracts.

G-E Expands Tri-Clad Line

Three new motors—a vertical general-purpose polyphase motor, a vertical shielded polyphase motor (1 to 20 hp) and a vertical shielded single phase motor (1 to 5 hp)—have been added to the General Electric Tri-Clad family. The shielded-type motors are especially suited to pumping applications, and the general-purpose motor is suitable for use in the machine tool industry.

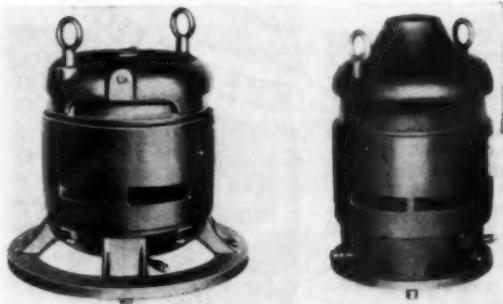
The compact, cast-iron frame and cover of general purpose motors (shown at the left) are designed to give added protection to electrical parts, without adding materially to over-all height. Use of Formex wire, new punchings and coil shapes, double-end ventilation, and balanced design contribute to long life.

Accurate alignment of motor driven unit is assured by machined rabbets on stator frame and base. Rotating weight and thrust are solidly transmitted to supporting base through lower bearing, which is fitted to a one-piece base. Bearings are of the deeply grooved type, encased in machined cast-iron housings.

All openings are shielded to bar entrance of chips or other falling objects. Accessibility of grease fittings allows rapid lubrication without disassembly; location of eyebolts makes motor easy to handle; speed measurements

are taken by removing monogram cap from upper end shield; a variety of bases makes it possible for this motor to meet many applications and mounting requirements.

The polyphase shielded-type motors (shown at right) are available in either solid-shaft or hollow-shaft construction, while single-phase shielded-type motors are available only in solid-



shaft construction. Both shielded types are for normal-thrust of high-thrust applications.

Cover is contoured to deflect dripping liquids and falling objects. All openings in stator frame and end shields are protected against the entrance of splashing liquids. Air is discharged downward at low velocity, permitting little or no dust disturbance around motor.

These motors are suitable for outdoor operation except where extremes of



INEXPENSIVE MICROMETERS

Sold Under a Money Back Guarantee

Complete set \$19.95

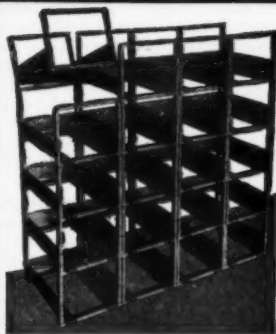
Consists of: 0-1" Micrometer, Outside. 1-2" Micrometer, Outside. 2-4" Micrometer, Outside (2 thimbles). 2½-4" Micrometer, Inside (3 measuring rods). Velvet lined case.

Write for FREE descriptive Catalog.

MICRO PRODUCTS CO.

210 JOS. CAMPAU

DETROIT, MICHIGAN



NEW BOX STORAGE

**speeds
parts
handling**

Every box is "on top of the pile" when you use STACKRACKS. Heavy containers slide in and out like drawers—you can get at the contents of any one quickly and easily without disturbing the others. Patented STACKRACKS, to fit your boxes, interlock to form storage units of any size, shape or capacity.

Write today for full information and low prices. Stackbin Corp., 55 Troy St., Providence, R. I.

STACKRACKS

"STACKED AND STILL ACCESSIBLE"

A CLAMP for Every Purpose



**Forged Steel
Quick Acting
Deep Reach
Welders**



Sizes Available:
 $\frac{3}{4}$ " to 10' opening
 $\frac{1}{2}$ " to 16" deep

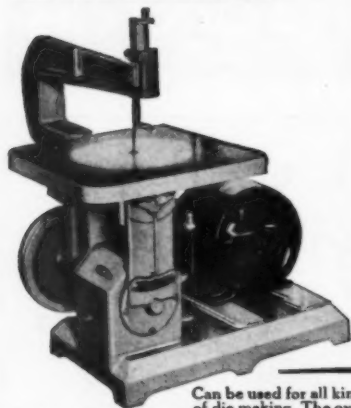
Write for CATALOG and PRICES on Clamps for all purposes as well as many other tools for use in the Machine Shop.

IN STOCK AT YOUR SUPPLY HOUSE

The Cincinnati Tool Co., 1945 WAVERLY AVE.,
CINCINNATI, OHIO



ON THE NEW ATLAS DIE-FILING MACHINES



Can be used for all kinds of die making. The over-arm is constructed so that the file and saw attachments may be interchanged with little effort. The hold-down fingers are attached directly to the over-arm. Working surface of the table, which tilts two directions, is entirely clear. An improved type chuck, consisting of movable hardened jaws, holds both saws and files. Screw adjustment makes changes easy and fast.

Price, complete with motor— **\$125.00** Net

F. O. B. CHICAGO

ATLAS EQUIPMENT CO.

103 S. Clinton St., Chicago, Ill.

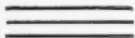
moisture, dust, or other harmful agents make selection of fan-cooled motors more economical. All frame sizes have common mounting dimensions, making possible interchangeability of many hp and speed combinations, including single-phase ratings. The motors can be rotated to any one of four base positions without modification of supporting structure.

To facilitate installation and impeller adjustment in pump installations, these motors can be obtained with hollow shafts. In such installations, pump shaft passes through hollow motor shaft and is supported on upper end by an adjusting nut. Torque is supplied to pump shaft by a nonreversing ratchet or jaw-type coupling.

De Boer Turnbuckles

The De Boer Multi-Purpose Turnbuckle is finding increasing use in defense industries today, especially in the Navy and private shipyards. It is of the handy 3" size, tapped $\frac{1}{4}$ " 20 thread and is made by De Boer Mfg. Co., Syracuse, N. Y.

THE MIDGET



HALF
SIZE

We can supply this Indicator with or without lug on back. Also with support arm for mounting on surface gage. Light weight makes it ideal for use with magnetic base.

Waltham Dial Gage Co
STOW, MASSACHUSETTS

Indexing

A valuable 88 page book "Milling Machine Indexing" by C. A. Felker and H. W. Paine has just been published by the Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee, Wis.

The book contains a complete coverage of the mathematics involved in the various types of indexing performed on the milling machine.

The six chapters are on direct, simple, differential, block, compound, and graduated indexing.

In addition, the following subjects are covered:—Indexing and the indexing attachment; indexing for spaces by direct indexing; indexing for angles; indexing for spaces by simple indexing, index plate and sector; indexing for degrees minutes and seconds; value of one hole moves.

Other subjects included are approximate method of indexing for degrees and minutes; continued fractions; angular indexing table for accurate indexing; indexing with high number index plates; cutting reamers with unequally spaced teeth; simple indexing with 5 to 1 ratio between crank and spindle; high number index plates on 5 to 1 ratio indexing attachment.

Further material includes the hypoid indexing attachment used to index for

3 TO 6 TIMES FASTER

FEDERAL DIAL FEED PRESSES

Federal Dial Feed Presses are speeding up both primary and secondary operations for many companies as much as three to six times. They can be operated safely at unusually high speeds due to positive indexing and locking mechanism and smoothness of action. Federal Dial Feed Presses are daily being put to work in new applications. Perhaps they can help solve your press problems. Write us—no obligation.

THE FEDERAL PRESS CO.

Elkhart, Indiana



MANY FEDERAL MODELS

Federal Open-Back, Inclined Presses are built in nine sizes — six to 80 tons capacity — flywheel or geared type. They represent the culmination of 40 years' intensive experience in press building.

degrees minutes and seconds; simple indexing with a 60 tooth worm wheel indexing attachment; differential indexing with simple gear trains; differential indexing with compound gear train.

In addition to the mathematical procedure involved, trade information is presented concerning indexing attachments in common use. Operations and constructions of the various available types can be understood easily.

D. C. Paste Cutting Compound

The power hack saw shown is used in the Hardware Mfg. Co., Milwaukee, cutting $\frac{3}{4}$ " rings from 7" hard tough steel tubing for roller bearing races. Cutting time is stated to be $1\frac{1}{2}$ minutes per piece, using a new cutting compound developed by D. C. Cooper Co., 18 East 18th St., Chicago.

The Company reports that cutting is done without smoke; the compound provides a continuous film on the blades which remains at all times, even after being shut-down over the week-end. To this they ascribe the minimum blade wear and breakage.

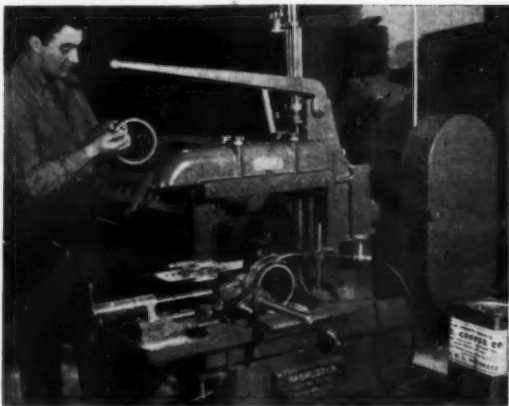
This Company had also found the compound helpful on milling, drilling, turning, threading and tapping operation, materially extending tool life.

The compound is mixed with up to 30 parts water. The compound is clean to use and leaves no grease on machine or work. The protective film which it leaves on the work, prevents rust and may be washed off with hot or cold water from parts that are to be plated. The compound contains no sulphur and is not injurious to machine bearings. It has no effect on rubber; does not stain brass or aluminum parts and no degreasing operation is needed after machining.

Monarch Issues Catalog

Monarch Machine Tool Co., Sidney, O. has just issued an especially attractive 42 page catalog of its lathes. In handy plastic binding and attractively printed in color the catalog is profusely illustrated. The text is short but complete and covers the numerous models in the Monarch line.

Of special interest are the page concerning their lathes with Automatic-Sizing controls, the Monarch-Keller

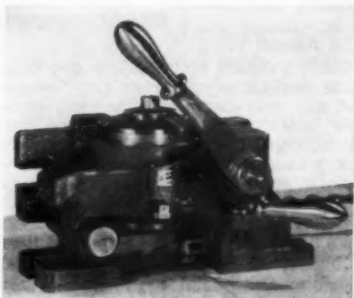


Magna-Matic full automatic lathe, Monarch force-feed lubrication, and the Flame-Hardening process used extensively in hardening ways and wearing surfaces.

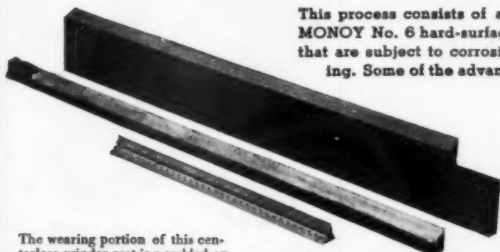
Dearborn Chucking and Indexing Fixture

A new model automatic chucking and indexing fixture is announced by J. W. Dearborn Co., 72 S. Cliff St., Ansonia, Conn. It can be placed in 3 positions on milling machine and can now handle long rods.

Work is held by draw in collets, which can be made interchangeable



COLMONOY FURNACE WELD PROCESS



This process consists of applying a casting of COLMONOY No. 6 hard-surfacing alloy to steel base parts that are subject to corrosion, abrasion, wear and galling. Some of the advantages of this process are:

1. It is adaptable to high production parts.
2. There is complete freedom from porosity and cracks.
3. Parts can be hard-faced which are inaccessible for acetylene torch applications.
4. Finishing requires the removal of considerably less material.

The wearing portion of this centerless grinder rest is a welded-on overlay of COLMONOY No. 6, applied to the base, after which it is machined. On machine tool parts subject to great wear and abrasion such as lathe points, dogs, chip breakers, drill flutes, wire straightening shoes, thrust bearings, screw machine fingers, grinder feed fingers, forming and drawing edges, etc., COLMONOY No. 6 is effecting substantial savings due to its long life, ease of application, wear resistance and freedom from galling.

WRITE TODAY

Ask for full information on the COLMONOY Furnace Weld Process, as well as all the grades of COLMONOY for every hard surfacing requirement.

COLMONOY
Hard Surfacing Alloys and Overlay Metals

WALL-COLMONOY CORP.

Sixth Floor, Buhl Bldg., Detroit, Mich.
NEW YORK TULSA BLADELL N. Y.
558 W. 54th St. 208 Midco Bldg. 21 Seneca St.
WHITTIER, CALIF. CHICAGO
123 W. Philadelphia St. 625 W. Jackson Blvd.

RICKERT-SHAFER

Specialists

IN
THREADING
TOOLS



AUTOMATIC
DIE HEADS

COLLAPSIBLE
TAPS

BORING
HEADS

FRICTION
TAPPERS

SPECIAL
THREADING
MACHINES

The RICKERT-SHAFER Co.
ERIE, PA.

with the original model, and will take up to 1" round. Hexagon, square and other shapes can be held by using special collets. Collets are opened and closed and work is ejected from collet after last cut by bringing table back a little further. According to the makers, 1000 light cuts per hour can be milled in brass or free machining steel.

There are 1, 2, 3, 4, 6, 8, 12 or 24 sides or slots. Pins in the indexing handle provide positive stops for each position. One full stroke of indexing handle gives 90° or 1/4 turn.

Tipping fixture the required number of degrees on milling machine bed and using standard straight cutter permits taper milling.

With the special type of collet used, ample chip clearance is provided down through the fixture.

Porous Iron Bearings

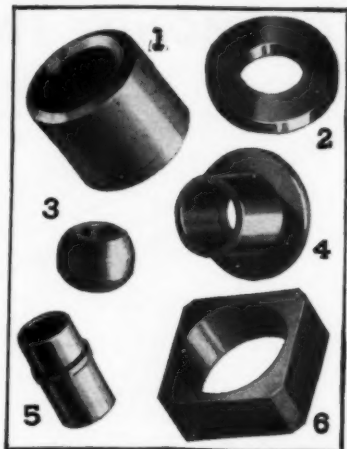
The Keystone Carbon Co., Inc., 1935 State St., St. Marys, Pa., announces the addition of Selflube porous iron bear-

ALPHIL Spot Welders More Production Lower Cost!

Features include: transformer which guarantees faster heat, stronger welds; water cooled electrodes and tips; automatic trip switch; adjustable arms; swivel pedal; and heat regulator.

If you have any production problems—consult us.

Alphil Spot Welding Co.
431 W. Broadway, New York, N.Y.



Standard shapes of Selflube bearings:—(1) sleeve or plain cylindrical bearings, (2) washer or thrust bearing, (3) spherical or self-aligning bearing, (4) flanged bearing. Examples of special shapes are shown at (5) and (6).

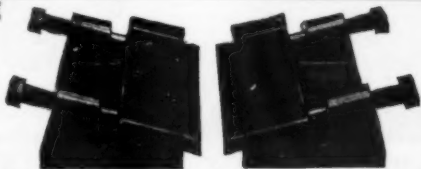
ings to their line of self-lubricating bronze bearings. These new porous iron bearings developed to conserve copper, are interchangeable with porous bearings in most applications.

Selflube porous iron bearings are made from powdered iron, which is moulded to size in the shape desired, then baked, and finally saturated with a good grade of oil. They have an average porosity of 25 to 35%, enabling

HART'S DIVIDED MACHINE VISES

These Vises will hold work the full length of the table, if necessary. Useful on planer, milling machine, surface grinder or drill. They adapt themselves to any shape and can be used on sides of table as well as ends. The jaws are tool steel and hardened, the angle holding the work down on the table.

HART MACHINE CO.
26 Mather St., Dorchester,
Boston, Mass.



Size of Base.....	5x7 inches
Size of Jaw.....	3x6 inches
Height at highest point.....	2 1/4 inches

When writing for descriptive circular kindly mention the BLUE BOOK.

them to store a large amount of oil which forms a protective, continuous oil film on the bearing surface. In many instances, this oil reserve lasts the entire life of the application, eliminating the use of oil vents or grease cups. Additional lubrication is recommended for heavy duty or continuous operating units.

According to the makers they have a low friction coefficient which, together with their self-lubricating qualities, prevents excessive temperature, speed reduction, noise and scoring of shaft. They are moulded to close dimensional tolerances so that no re-designing or special engineering is required and are supplied in both standard and special shapes, as shown.

Heat-Treating Silver Alloys

Sterling silver, which contains 925 parts of fine silver and 75 parts copper (or 7½% of the total weight) is among the silver alloys which can be hardened by heat-treatment as well as by cold working. Maximum softness, 12 Scleroscope (universal hammer) equivalent to 18 Rockwell (1/16" ball-100-kg. load) can be obtained by heating to 1400 F and instantly quenching in water. If the quenched piece be then heated for 15 minutes at 600 F and allowed to cool in air, the hardness will approximate that which would result from cold rolling with a 50% reduction in thickness. Sterling silver which is heated to 700 F and quenched has a Scleroscope hardness of 23 and Rock-

well hardness of 47. Among the industrial uses of sterling silver is that for electrical contacts in which hardness naturally promotes resistance to wear. Fine silver and coin silver are also used for contacts as are many proprietary alloys and mechanical mixtures, the latter being the result of sintering powdered metals or mixtures in which graphite is one constituent.



FOR THE DURATION !

- MORE SPEED
- LOWER COSTS

FAMCO Presses step up production and assembly operations requiring percussion and pressure. 40 STOCK SIZES AND MODELS scientifically engineered for greater capacity, size for size, and trouble-free operation.

PROMPT DELIVERIES !

Write for details.

FAMCO MACHINE CO.

1320 18th St.,

Racine, Wis.



famco FOOT AND ARBOR
PRESSES



HART'S MILLING FIXTURES

These fixtures will make themselves popular and profitable in your shop. Easily kept clean to receive the work. May be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes—¾" to 4".

HART MACHINE CO.

26 MATHER ST., DORCHESTER, BOSTON, MASS.



BUILDERS 'T' SURFACE GRINDER

Don't let small picayune jobs hold up expensive grinders!

The "T" Surface Grinder sells itself to the shop man who has 1001 different odd grinding jobs which can be done easier, quicker and better on this small, inexpensive machine, built for just such service.

PROMPT DE-
LIVERY on
priority
orders.



Ask for
Bulletin N-644



BUILDERS IRON FOUNDRY
21 Codding Street
PROVIDENCE RHODE ISLAND

Tape Rules

An inside measure tape rule is being made by Master Rule Mfg. Co., Inc., 815-9 E. 136th St., New York City.



Reading is made directly, and is said to be accurate between .003" and .005". A precision lock retains all measurements.

Pistol butt shaped case can be taken apart and cleaned. The old worn blade can be slipped off and easily replaced. Figures are said to be permanently etched, and are available on either one or both sides of tape. It is available in 6 and 8' lengths, and 9/16 and 13/32" widths.

Motor Control Center

For group control of a-c motors up to 100 hp for industrial use, a new control center with interchangeable units is announced by Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

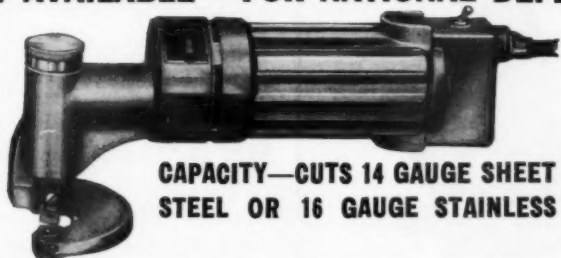
Available in 76 and 90" heights, the centers consist of (a) a 7" filler at top for horizontal buses and cable trough, (b) a 5" filler at bottom for cross cable duct, (c) an 8" filler for master terminal boards, and (d) multiples of the basic 14" starter unit heights.

Interchangeable units are trim mounted 20" wide, permitting 2 to 5 control elements to be placed in a single section. Sections are 20" deep allowing sufficient depth to mount units on each face, i.e. back to back if desired.

For operation on 3-phase, 220, 440 and 550 volt circuits, motor starter units consist of a full voltage magnetic starter providing external manual reset, thermal overload, and low voltage protection. The disconnect switches may be unfused, quick-make and quick-break, of the circuit breaker type with thermal inverse time overload and instantaneous short circuit protection. A fused disconnect switch is available up to 7.5 hp, 220 volts; 15 hp, 440 volts.

GES Electric Hand Shears

NOW AVAILABLE — FOR NATIONAL DEFENSE



**CAPACITY—CUTS 14 GAUGE SHEET
STEEL OR 16 GAUGE STAINLESS**

This new sheet metal shear was brought out to fill the demand of the sheet metal industry for a very light weight but powerful, fast cutting tool, capable of cutting accurately to the line along straight lines as well as along small curves.

This sturdy shear will give a life time of service. The ball bearing "Grip" type Universal motor $\frac{1}{2}$ horse power will operate on either AC or DC and 110 or 220 volts, 25 to 60 cycles. This new model has fuse protection incorporated in switch box. Alloy Steel cutters—will cut at the rate of 6' 6" per minute on 14 gauge sheet steel. Write for further information.

James W. George Machinery Company
3146 EAST JEFFERSON AVENUE, DETROIT, MICHIGAN

LIGHT ?



**CHICAGO
"ADJUSTABLE"
SHOP-SPOT-LIGHT**

Places Light Where Light is Needed

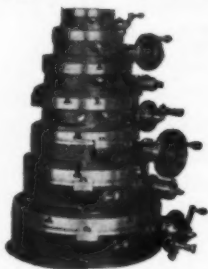
MODELS FOR OFFICE,
FACTORY, DRAFTING
ROOMS, ETC.

Catalog furnished on request

CHICAGO DIE CASTING MFG. CO.

2502 W. Monroe Street, Chicago, Illinois

TROYKE ROTARY TABLES **Very Quick Deliveries**



Sizes 9", 12", 15", 18", 21", 25"

Ask your dealer or write us for
eight page catalog.

ALFRED A. TROYKE

4422 Appleton St.,

Cincinnati, O.

—GEARS—

**Spur—Helical—Worm—
Bevel—Miter, Etc.**

We do broaching and all kinds
of grinding.

We specialize in grinding hard-
ened steel bushings, cam rollers,
etc.

Prompt service and quality has
retained a large list of customers
for 25 years.

TAYLOR MACHINE CO.

1919 E. 61st St.,

Cleveland, Ohio

Vernon 6" Index Center

Machinery Mfg. Co., 1915 E. 51st St.,
Vernon, Los Angeles, Cal. announces
its new 6" universal index center. The



plates furnished as standard equipment
will divide all numbers to 50, and all
even numbers to 100 with the exception
of 96 T.

Worm is quickly and easily accessi-
ble by removing cover plate, and to-
gether with worm gear is cut with
provision for take-up in case of wear,
it is said. Head can be set by means
of positive clamp, at any angle from
10° below the horizontal to 10° past
perpendicular.

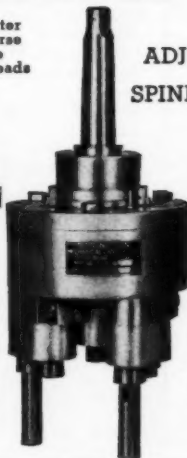
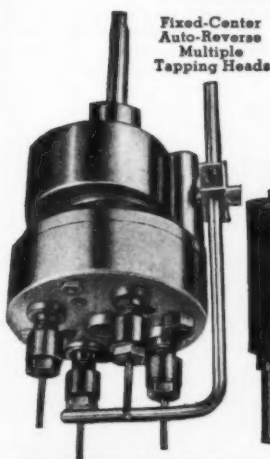
Saving Tungsten by Using Silver

Tungsten is on the critical list. It's
scarce. Silver is more plentiful—and
is helping to save tungsten. There is no
need, for example, to make high-speed-
steel tools entirely of high-speed steel.
Only a small tip need have the tung-
sten-bearing alloy. Practically all the
rest can be of carbon steel—thanks to
the use of silver brazing alloys for
making a secure joint between the two
other metals. A joint less than 0.003"
thick turns the trick, hence mighty
little silver is needed and the cost is
slight. The same is true in millions of
joints brazed with silver alloys or made
with silver solders. Such joints stay
put. They are serving scores of de-
fense needs—among many others—and
are destined to still wider use in the
opinion of the American Silver Pro-
ducers' Research Project which, under
Handy & Harman direction, is investi-
gating a great variety of potential ap-
plications of silver in industry.

ERRINGTON MECHANICAL LABORATORY

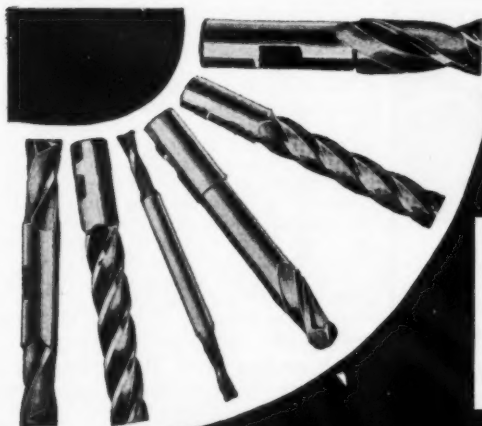
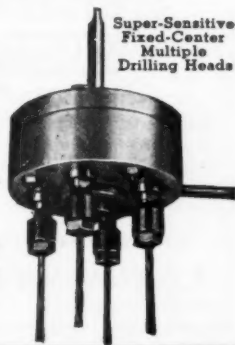
STAPLETON, STATEN ISLAND, N. Y.

MULTIPLE HEADS



ADJUSTABLE MULTIPLE
SPINDLE DRILLING HEAD

All Parts
Fully
Enclosed
to Insure
Pressure
Lubrication
and
Rigid
Support of
Adjustable
Spindles



*Shear Cut —
High Speed*

END MILLS

Shear Cut End Mills
are offered in all
standard sizes, single
and double end.

*Write for catalog
and prices today.*

PROGRESSIVE TOOL & CUTTER CO.
2345 WOLCOTT ST., FERNDALE, MICHIGAN

BAUMBACH



STANDARDIZED

DIE SETS

Machined Steel Semi-Steel

Drop Forged Steel

Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

Send for our new 336 Page Catalog.

E. A. BAUMBACH MFG. CO.

1810 So. Kilbourn Ave., CHICAGO, ILL.

**MADE OF ALLOY STEEL
MILLED FROM BAR**

**SOCKET HEAD
CAP SCREWS**






**ECONOMY
MACHINE PRODUCTS
COMPANY**

**SAFETY HOLLOW
SET SCREWS**

Try Them On Your Next Job!

**ECONOMY
MACHINE PRODUCTS
COMPANY**

5207 Lawrence Ave., Chicago, Ill.

Matthews Shell Marking Machine

A Heavy Duty No. 79 Shell Marking Machine has been developed by Jas. H. Matthews & Co., 3942 Forbes St., Pittsburgh, for high speed marking of 105, 155, 5" and 6" shells. This unit is based on the same principle as their light duty No. 79 Machine, which is recommended for marking 20 MM to 75 MM shells.



Required data is marked on shell by means of interchangeable steel type, set up in a roller die in the machine. It can be changed quickly for various lot numbers, date of manufacture, size, and other necessary lettering. Depth of the marking is controlled by simple adjustments. Shells roll down the gravity feed way, and are automatically selected and ejected at high speed.

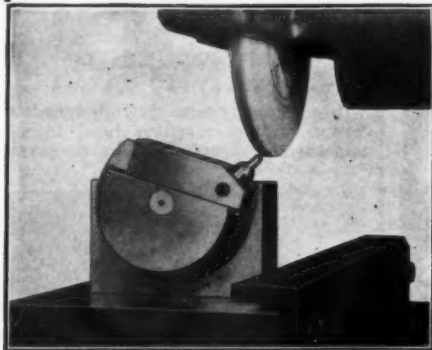
The machine weighs approximately 2000 lbs. Overall size is 60"x22"x53". Capacity is given as 12—155 MM shells per minute.

Stainless Steel Data Sheet

A Data Sheet entitled "Characteristics of Rezial Stainless Steels" is announced by Crucible Steel Co. of America, 405 Lexington Ave., New York City. This gives in handy tabular form the important information necessary in specifying or using the leading Stainless Steel grades.

Speedy!

The WELCH Quick Angle Dresser speeds up the accurate dressing of grinding wheels to any required angle. It is quick and easy to use . . . accurate and precise in the results obtained.



Precise

The WELCH Quick Angle Dresser is available in plain or vernier types. Revolving dial on the plain type is graduated in degrees and the zero line is on the base block.

Vernier type has the same graduated revolving dial, with vernier cut into the base block. This is an unusual feature and precludes possibility of the vernier being moved.

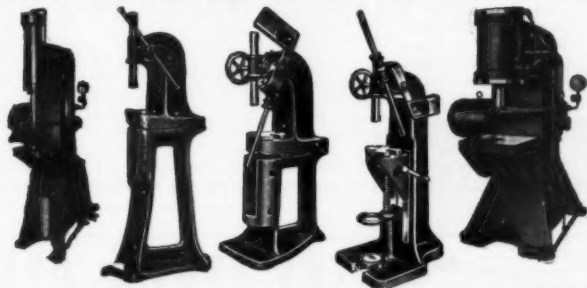
After setting dresser to the required angle, tighten knurled hand knob and dresser is ready for use.

Vernier type dresser, complete with one diamond **\$82.50**

Write **TODAY** for full information and prices.

Welch Industries Incorporated
Makers of HIGH SPEED MILLING CUTTERS
FORM TOOLS and SPECIAL TOOLS
19900 W. Eight Mile Road
DETROIT, MICHIGAN

For AIRCRAFT and MUNITIONS



**1883
GREENERD**

The Originators
of the
Arbor Press

1941

PRECISION WORK IN REARMAMENT

65 Standard Styles and Sizes. Manually operated presses $\frac{1}{4}$ to 35 tons pressure. Motor driven hydraulic presses $1\frac{1}{2}$ to 30 tons pressure.

Let us send you our catalog No. F.

GREENERD ARBOR PRESSES

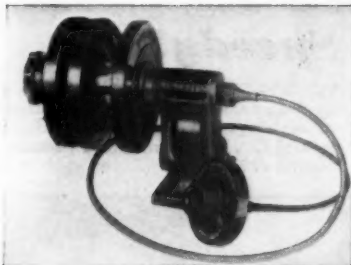
NASHUA

Est. 1883

NEW HAMPSHIRE

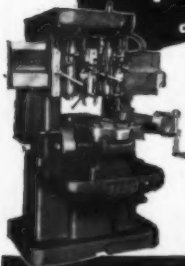
Variable Speed Reducer

Speed-Jack Corp., Belleville, N. J. produces a variable speed reducer which can be built into and made a part of machine tools if desired. The speed is regulated by a knob which affords remote control of the relationship of members of the variable V-drive pulley shown in the picture. These disks move in or out to increase or decrease in stepless increments, the drive speed ratio.



Preloaded Precision Bearings for Spindles

MOREY 12M HIGH-SPEED VERTICAL PROFILER and MILLER



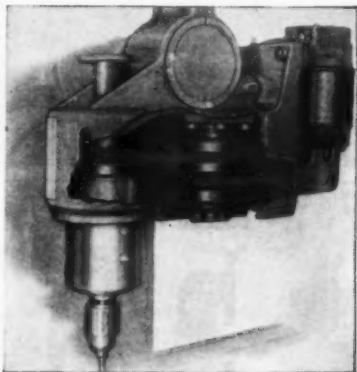
Two spindle or single spindle

Speed and more speed in the production of interchangeable parts requiring milling of any contour or outline is yours in the MOREY 12M. Provision for increased clearance between spindles and table.

Ask for Bulletin 680-A

MOREY MACHINERY CO., INC.
410 Broome Street New York, N. Y.

This company also has designed a vertical milling machine head incorporating the Speed-Jack transmission.



Construction is such that it need not be removed from the machine, but can

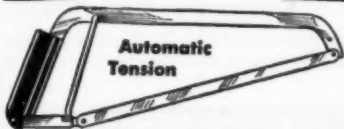


Exclusive
KNUCKLE-GUARD

RAPID COMBINATION SAW

Change from full throat to taper in 30 seconds. Patented handle locks blade tight—change in 2 seconds. All-steel construction—crackle grip handle. 6 Types. Write for complete information.

TWO SAWS in ONE



Automatic
Tension

RAPID MANUFACTURING CO.
Box 488, - - Glendale, California

GAP GAGE GRINDER...

Precision-built for precision work. The table, ground to extremely close limits, is longitudinally controlled by a feed screw with dial graduated to .0001". Wheel spindle, mounted on preloaded bearings in ground housings, is balanced to eliminate vibration. Smooth, easy lateral movement by pinion and rack on cross slide. Simplicity of operation assures highest grade work in minimum time.

**REDUCE GRINDING COSTS ON
YOUR GAP AND SNAP GAGES**

An ordinary mechanic can learn to do first class work efficiently with only a few hours training. Machine can also be used for other types of grinding work.



Write for our new circular describing this machine in further detail and giving complete specifications.

**NY-LINT
TOOL
AND
MFG.
CO.**

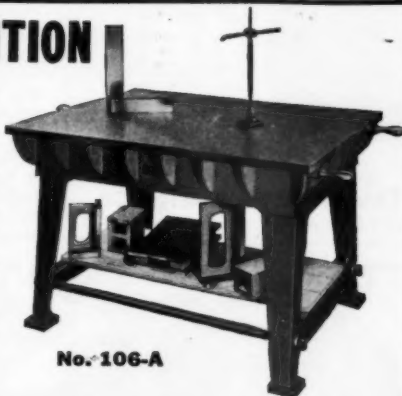
NY-LINT TOOL & MANUFACTURING CO.
1823 16th AVE., ROCKFORD, ILL.

A USEFUL ADDITION

Modern precision machine shops and inspection departments will find this sturdy 36"x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight 1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.

We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. Write today for full information.



No. 106-A

J. C. BUSCH COMPANY ENGINEERS AND MACHINISTS
SINCE 1907
165 SO. BARCLAY ST., MILWAUKEE, WIS.

**Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS**



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

**Write for Circular
NIELSEN TOOL &
DIE COMPANY**
1859 Gardner Ave.
Berkley, Mich.

**AUTOMATIC METAL SAW
GRINDER and RETOOTHER
MODEL IC**



**PRECISION
and
ACCURACY
AUTOMATICALLY
ASSURED**

For metal cutting
saws 2" to 14" in dia.
When specified, saws
as small as 3/4" dia.
and 1/32" to 2" spac-
ing. Also supplied as
a Combination Grin-
der for circular, band
and hack saws.

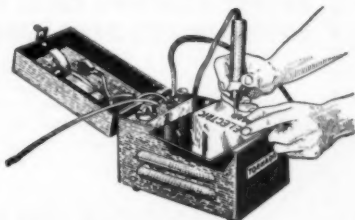
WRITE FOR CIRCULAR

The Wardwell Mfg. Co.
3165 Fulton Rd. Cleveland, O.

be put back out of the way on the arm to allow use of the horizontal miller. It can be operated at any angle up to 90°.

Tornado Electric Etchers

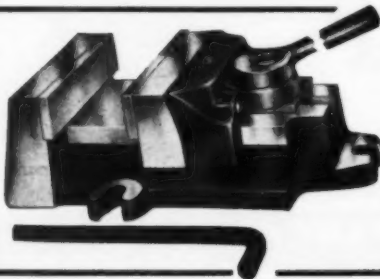
Electric etchers of special design are now added to the line of Breuer Electric Mfg. Co., 5118 N. Ravenswood Ave., Chicago. They are specially adapted for marking dies, tools and other portable equipment for permanent identification of all smooth-surfaced steel and iron parts. Included are tools,



switch, indicator lamp, cords, etc. all of which are contained in a compact, portable case. It is said to be just as simple as writing with pencil.

Etchers are made for both light and heavy etching. The lighter type of etching is for tools, gears, saws, etc.; the heavy-duty etching on large-sized smooth-surfaced objects such as shovels, crowbars, castings, etc.

Red light tells operator when switch is on. Etcher plugs into line supplying proper current. Switch is turned to desired etching heat. Model A weighs 16 lbs. Model B weighs 29 lbs.



**PLUNKET QUICK ACTION VISE
for DRILL PRESS OR MILLING MACHINE**

Designed for production work, using an eccentric motion to apply pressure to jaws. All eccentric parts are hardened to insure long life. Eccentric motion moves jaw 5/16".

Size 6" jaws, 1 1/2" deep, opens 4".....**Net Price** \$38.50
Pressure between jaws, with handle furnished 2200 lbs. Net weight 36 lbs.

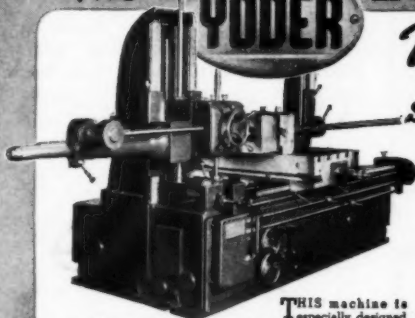
WRITE FOR CATALOG

J. E. Plunket Machine Co., 1823 W. Lake St. CHICAGO, ILL.

The YODER

BORING MILL

*Versatile also :
IN THE USE OF
SPECIAL ATTACHMENTS*



THIS machine is especially designed to perform every known boring mill operation with the utmost accuracy and with uncommon convenience and speed. It is also designed to mount various attachments to handle those unusual but important jobs which pop up when least expected. You want to obtain the greatest possible value in a boring mill. Write **NOW** for the YODER illustrated bulletin before placing your order.

THE YODER SALES CO.

5500 WALWORTH AVENUE
CLEVELAND, OHIO

FACING HEAD

A star feed Facing Head is made to be bolted to the spindle face plate. The unit illustrated above has a capacity for facing work from .6" to 30" in diameter and can be quickly attached and detached.



AUXILIARY TABLE

An Auxiliary Table 12" x 36" with one ten slot will be found invaluable when large work is to be bored or milled.



CIRCULAR TABLES

Circular tables can be furnished in 16", 24" and 28" diameters. The plates are graduated in degrees and the dial in minutes. A dividing attachment can also be furnished if desired.



LATHE PANS

Speed up your production by having Littleford make your Lathe Pans. No matter what size or shape, our special fabricating department can produce them at a lower cost. Send blueprints today for prices.



LITTLEFORD

LITTLEFORD BROS., INC.

435 E. Pearl St.

Cincinnati, Ohio

SCREW MACHINE SET-UPS

COMPLETE
FOR

BROWN & SHARPE AUTOMATICS

George L. Detterbeck Co.

Formerly Banner Mfg. Co.

1871 Clybourn Ave.

:-:

Chicago, Ill.

RELEASE LARGER MACHINES FOR HEAVIER WORK

PUT SMALL
JOBS ON THIS

LINLEY

VERTICAL MILLING
AND JIG BORING
MACHINE



This machine is ideal for tool, die, fixture and pattern work. Is versatile and accurate. Micrometer screw feed quill. Direct reading eliminates pencil figuring and possible errors. Smooth accurate boring is assured to any predetermined depth to 3'.

Write for
descriptive Bulletin.

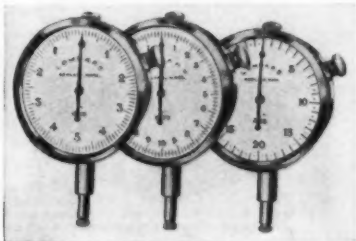
LINLEY BROS.

COMPANY

11 MONTAUK ST.,
BRIDGEPORT, CONN.

Lombard Dial Gages

New dial gages are announced by Lombard Governor Corp., Ashland, Mass. There are 4 types—A-10 graduated to .0001, AJ-5 to .0005, A-20 to .0002, and A-30 to .001". Brass gears and cases are used, with spindles of



stainless steel. They can be furnished with plain back for mounting by clamping on bushing, or with standard lug back.

Dials are 2" in diameter, and turn to set the zero to pointer position. Solid front and back plates are applied directly to case. It is claimed that this method of assembly eliminates need for dowels and assures longer gage life.

A special spindle cleaning arrangement is available for gages that are subjected to excessive dirt, dust, or grinding compounds.

Drilling Machine Attachment

A new attachment for mechanically raising the drill press head or work table, or both, is now being made by

COMBINATION CENTER DRILL

Special Alloy and High Speed Steel.
Ground with Radial Relief.
Will give more production at less cost.

Write for catalog.



CIRCULAR TOOL CO., INC.
767 ALLENS AVE. - PROVIDENCE, R. I.

Chicago - Philadelphia - New York
Dayton - Cleveland - Syracuse -
Indianapolis - Detroit - St. Louis

EASY ... TO STEP UP PRODUCTION!

● Modern Motor Drives replacing old line shaft equipment provide efficiency equal to many dollars' worth of new machine tools. Users report savings in time, power, floor space, cost of machine operation.

Modern Motor Drives for lathes, shapers, millers, drill presses, punch presses, grinders and hacksaws. Write for complete information.

MODERN MOTOR DRIVES, INC.
ELKHART, INDIANA



ATLANTIC Band Saws for CONTOUR CUTTING



Packaged in Special Box. Permits easy withdrawal to length desired. 100' lengths.

You can simplify CONTOUR CUTTING by using Atlantic narrow sized blades with one temper only. They are best for cutting any and all metals and are used on all makes of band saw machines.

**Send for New
ATLANTIC
BOOKLET
covering our
entire line.**

**ATLANTIC
BAND SAWS**



Used Coast to Coast

ATLANTIC SAW MFG. CO., INC.
153 BREWERY ST., NEW HAVEN, CONN.
"Metal Band Saw Specialists"

BUY WHITNEY-JENSEN
METAL-WORKING MACHINERY and HAND TOOLS
for LONG LIFE and ACCURACY

BENDING BRAKES

20 ga. 49 in. to 12 ga. 10 ft.

Whitney-Jensen brakes cover a wide range of most useful sizes and types. Moderately-priced, of high quality and durability, they are a worth-while investment for any shop doing sheet metal work.

Write for Complete Information



12-14-16 ga. / 4-5-6-8-10 ft. sizes.

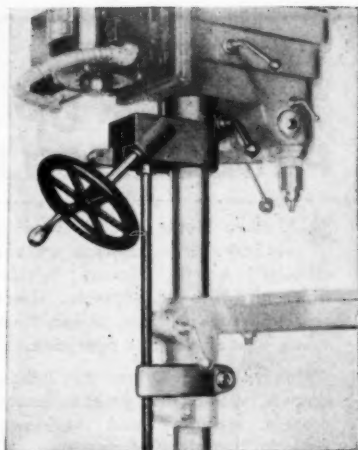
WHITNEY METAL TOOL COMPANY
115 FORBES STREET • ROCKFORD, ILLINOIS

SPEED-UP YOUR RIVETING OPERATIONS

A great help in Defense Production, these **Grant Riveters** are available in Noiseless Spinning and Vibrating Hammer types, also Vertical and Horizontal Multiple Spindle Spinning Machines. Information? Write!



THE GRANT MFG. & MACHINE CO.
C. E. Station, Bridgeport, Conn.



Boice-Crane Co., 936 W. Central Av., Toledo, O. The adjustment is made merely by manipulating two standard locking levers a partial turn each. The attachment fits any machine using $2\frac{3}{4}$ " diameter tubular column, and can be added to machines already in operation.

All gears are machine cut steel, copper-brazed to their shafts. Shafts are installed with ball thrust bearings for easy operation. Gear housing is grease packed, and the actuating screw is of steel with Acme thread.

G-E Issues Heating Catalog

Publication GED-650B, just issued by the General Electric Co., Schenectady, N. Y., lists the complete line of G-E electric heaters, heating devices, and heat control equipment. Many items are accompanied by a list of applications as well as by installation and operation data.

All items are illustrated, and many photographs show interesting jobs being done by electric heaters in industry. Information useful in calculating power requirements, a tabulated list of uses for G-E electric furnaces, and a list of G-E industrial heating publications round out the catalog.

Raising Output

Supervisors can do much to help themselves, their companies and the nation by making the most of available skill and talent.

If a high priced toolmaker has to waste time dressing a wheel before he can sharpen an essential tool, that's an economic waste. Rough work should be prohibited on abrasive wheels where exact grinding operations are to be performed.

Another serious loss may involve delays at tool cribs, where skilled workers should be given preference, or errand boys should do the waiting.

Skilled mechanics should not be required to waste time removing chips, cleaning or oiling machines.

Simpler set-ups should be handled by machine operators instead of the highly skilled men.

Much time is lost by skilled men hunting for tools. The remedy is a tool kit for each important job.

Removing excessive amounts of material takes a heavy toll of skilled labor hours. Proper sizes should be provided, or less talented labor used on roughing operations.

Ready reference charts of decimal

WHEREVER PRODUCTION DEPENDS ON PUMP RELIABILITY — Specify Brown & Sharpe



ROTARY GEARED PUMPS

Spur Gear
Helical Gear
Bronze
Reversible
For Hydraulic Operation
Motor Driven

CENTRIFUGAL PUMPS

Motor Driven
Several styles for a wide
flexibility of installation

Also No. 8 Vane Pump for lubrication

Use dependable
Brown & Sharpe Pumps

... for coolant—pressure—
lubrication—hydraulic operation
of machines—and miscellaneous
combinations.

Tell us your pump needs—



Brown & Sharpe Mfg. Co.
Providence, R. I.
U. S. A.

BROWN & SHARPE PUMPS

equivalents, speeds, feeds, drill sizes, tolerances, etc., can save much valuable time.

Instructions should be planned in advance to save time of skilled workers. A few hours' checking in the drafting room may save many in the shop.

Supervision and surveys may reveal the loss of many man-hours. Success or failure of our war effort rests largely upon our production foremen. (These recommendations originally appeared in Supervision Magazine.)

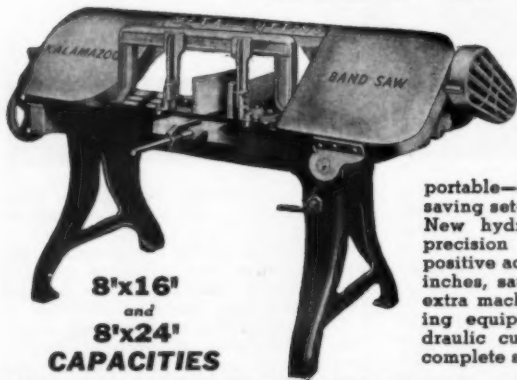
Yale Uses Wood Instead of Steel



The current steel shortage resulting from our war efforts is directly responsible for construction of the Yale Timber-Lock skid platform made of

specially selected tough oak instead of steel. According to the makers, its unique design gives all the strength inherent in steel welded construction

★★★★★ An Important Machine Tool In AMERICA'S SPEED-UP PROGRAM



8'x16'
and
8'x24'

CAPACITIES

The cutting speed and complete adaptability of the Kalamazoo Metal Cutting Band Saw make it exceptionally valuable in America's growing war industry. It is easily portable—can be moved to the work, saving set-up time and waste motion. New hydraulic controls and new precision design make possible positive accuracy within thousandths inches, saving expensive steel and extra machining. Sturdy, ball bearing equipped throughout, with hydraulic cushioned action. Write for complete specifications.

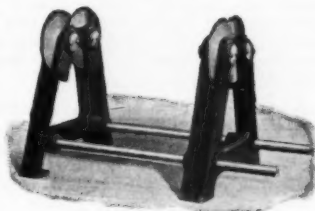
MACHINE TOOL DIVISION
KALAMAZOO TANK & SILO COMPANY

508 HARRISON STREET
KALAMAZOO, MICHIGAN



There's no argument about it, **ANDERSON BALANCING WAYS** do an accurate job

If your shop handles rotating parts, consider the installation of this simple, efficient device for balancing, straightening and truing operations.



No leveling required . . . no need of centering . . . simply place part to be tested on the four chilled iron discs rotating on special supersensitive ball bearings. Save time and trouble . . . be sure of accuracy.

The revolving, chilled iron discs and spindle to which they are fastened are ground and balanced to extreme accuracy. Spindles and bushings are hardened . . . glass hard . . . yet without danger of breaking.

Write to

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

ANDERSON BROS. MFG. CO., 1907 KISHWAUKEE ST., ROCKFORD, ILL.

DYER

Heavy Duty Spot Welders



Floor models
10 to 35 KVA.

6 point selective switch on all floor models allows for quality welds on various materials. Standard and Underwriters Labeled Machines.

3 point switch on bench models.

Bench models $2\frac{1}{2}$ to 10 KVA—with or without pedestal.

**PROMPT
DELIVERY**



*Few
Territories
Available.*

Dyer Welders are available in a wide range of sizes and capacities—air, motor or foot operated, giving maximum production—simplicity of operation—power economy.

**The Topeka Foundry & Iron Works Co., 300-332 Jackson St.
Topeka, Kansas**

used in the past because of a new interlocking "wood-weld" process tying the supporting leg runners and deck boards into virtually one inseparable unit.

Deep cut grooves run along the entire length of the platform deck boards, and into each one, the supporting leg beam is tightly fitted, interlocking platform and beams in a vise-like grip which is said to completely eliminate any tendency toward rocking, shaking and other forms of instability.

It is available in all standard lengths and widths, plain or armored end, vertical or standard leg design, four or six leg construction featured by Yale & Towne Mfg. Co., Stamford, Conn.

Machine Tool and Machine Shop Practice Calendar

A 1942 combination calendar and educational course on Machine Tools and Machine Shop Practice is now available from Continental Machines, Inc., 1300

S. Washington Ave., Minneapolis, Minn.

This calendar contributes in many ways to Defense Training Programs. It serves a most useful purpose in teaching basic principles of production. A greatly increased quantity is available over last years' distribution of 10,000 copies. Schools and industries will find the contents of this pictorially illustrated calendar of real help in teaching students and apprentices. The calendar begins with the month of March, 1942 and carries through for February of 1943.

Twelve comprehensive lessons on metal working are presented. The Machine Tool and "Chip Production" pictures are in black, blue, and red colors. Red is used to emphasize the cutting tool of the machine; blue, for the material cut; and, black, for the machine itself. Mechanical operation, terms, cutting tools, and the chips formed by each machine tool are emphasized. Photomicrographic studies of material cut by each machine are high-lighted.

Parts of the course are elementary for the benefit of apprentices and learners. New information is given on "Chip Production" for all 11 basic types of machine tools. An illustrated historical reference accompanies each machine tool study which will be of interest to "old timers."

The calendar is large enough to be seen across a large room, measuring 40"x22". A strong metal binding permits hanging indefinitely without sagging or curling of pages.

"ALNOR" PYROMETERS

for every requirement.

Inexpensive, accurate, durable.

Write for catalog.

Illinois
Testing Laboratories, Inc.
150 W. Hubbard St., Chicago



First Manufacturer of Adjustable Limit Snap Gages in U. S.

A G D Standard

Plug Gages—Adjustable Limit Snap Gages

Adequate stock ready to grind to special specifications

Priced on Cost—not on Demand

JAS. CLARK

143-17TH AVENUE,

PATERSON, N. J.

Successor to

Jas. Clark Jr. Pneumatic Tool Co. and American Gage Co.



Here's Something!

**A Machine That Hopper
Feeds and Drives**

**No. 2 Screws $\frac{1}{8}$ " Long
At ONE Second Each.**

THREE MODELS AVAILABLE

SCREW SIZES NO. 2 TO $\frac{5}{8}$ " DIA.

**SEND SAMPLES FOR PRODUCTION
ESTIMATES**

DETROIT POWER SCREWDRIVER CO.
2809 W. FORT ST., DETROIT, MICH.



BLACK DIAMOND

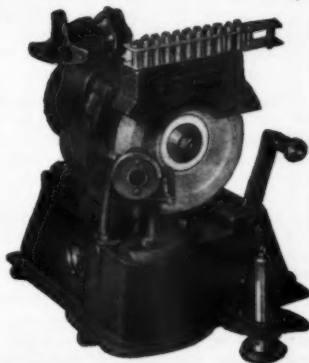


PRECISION DRILL GRINDERS

With the Black Diamond Drill Grinder no mechanical knowledge or skill is required to grind drills accurately.

This is the only machine available that will sharpen small wire gage and fractional drills quickly and with absolute accuracy. No other machine provides for such precision grinding on all size drills without time-consuming, complicated adjustments.

Write for Bulletin No. 122-H, for complete details.



BLACK DIAMOND

SAW & MACHINE WORKS, INC.
NATICK, MASS.



SAVE ON BACK WORK WITH THE NILSON TILTING WIRE REEL

Save back
work and all

useless motion with the Nilson Tilting Wire Reel.

A foot lever is tripped, the guards removed, a coil of wire slid upon the carrier, the guards replaced and set screws tightened, an easy lift, and the counter-balancing weight does the rest, bringing the tilting section to an upright position, ready to feed the wire into the machine. Simple in operation, and may possibly save your men from sprains, resulting in lost time and production.

Send for bulletin No. 51 and learn how to save in other ways too.

The **A. H. NILSON** *Machine Co.*
BRIDGEPORT, CONN., U.S.A.

G-E Announces Fan Motors

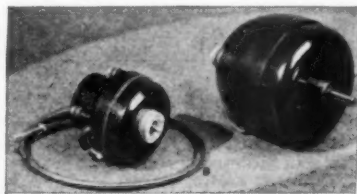
A new line of unit-bearing, shaded-pole fan motors for applications requiring a short, quiet, compact motor is announced by General Electric Co., Schenectady, N. Y. These motors are available in three models for 115-volt, 60-cycle operation.

Frame 51AL operates with or without air over the motor at 1.5 watts, 1550 rpm, and with air over motor at 3 watts, 1400 rpm. Frame 51EL requires air over the motor at 9 watts, 1550 rpm, and operates with or without air over motor at 3.5 to 6 watts at 1550 rpm. Frame 71GL is rated 1/40 and 1/25 hp, 1550 rpm, air over the motor, and is for use with direct-connected propeller fans only.

Both bearings and motor core are machined in one setup in a single cast member for uniform air gap and true bearing alignment necessary for quiet operation and uniform, consistent performance.

A large oil reservoir with a generous

supply of oil provides for many years of operation without reoiling. Free oil in the reservoir is transferred to shaft of motor through wool felt, and is then pumped through bearings and into the oil return, from which it flows back to reservoir.



End-bump and axial-thrust forces are counteracted by the magnetic forces tending to hold rotor in alignment with stator. This arrangement provides a frictionless, non-wearing thrust arrangement, and a permanent, free-operating, unchangeable end-bump take-up.

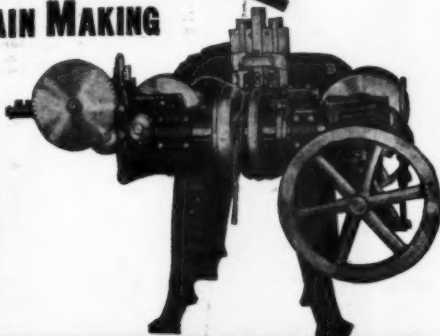
STRONG STANDARD SIZE CHAINS

WITH THE NILSON CHAIN MAKING MACHINE

To make a full line of standard size chains as known to the trade, Nilson makes the four necessary sizes of machines. Chains produced by these machines are strong, durable, safe and flexible.

20% increase in strength due to the fact that the ends are tucked in, leaving them perfectly smooth on both sides, enabling one to run them through the hands without injury. They will run accurately on sprockets for conveyors or power transmission purposes.

Let us send you complete details.



The **A. H. NILSON** *Machine Co.*
BRIDGEPORT, CONN., U.S.A.

Other features include an oil-reservoir cavity designed so that the oil will not spill regardless of how motor is handled in production or shipment, and a short, compact construction which will fit in many locations where a conventional motor might be too large. On the 51A and 51E frames a special mounting arrangement for fan blade permits use of simple, low-cost formed blades without hubs.

OPTICAL COMPARATORS

★ ★ ★

MILLING MACHINES

★ ★ ★

ROTARY SURFACE GRINDERS

Write

PORTMAN MACHINE TOOL CO.

Mount Vernon, N. Y.

— CAN YOU SEE AROUND —
A CORNER ?

Inspection of hard-to-get-at places
now made certain and accurate with the help of

**WAPPLER
INDUSTRIAL TELESCOPES**

*Write for
our Booklet:* "Precision Instruments for the Exact Inspection of Internal Surfaces."

For prompt action and our recommendations, include drawing of part to be inspected, or preferably the part itself.

Industrial Division

AMERICAN CYSTOSCOPE MAKERS, Inc.
FREDERICK C. WAPPLER, Pres.
1241 Lafayette Ave. (Bronx) New York, U.S.A.



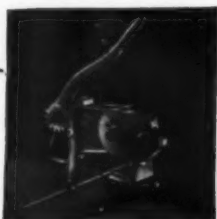
MULTI-PURPOSE TURNBUCKLE

Stand. $\frac{1}{4}$ — 20 Thread

An extremely handy 3" Turnbuckle or Swivel Screw. Will prove useful in industrial and manufacturing plants, shipyards, etc.

DE BOER MFG. CO., Inc.
SYRACUSE, N. Y.

A
Midget
in
SIZE
★



A
GIANT
for
WORK!
★

THE WONDER CUTTER

Cuts wire, rods or band iron easily and quickly. Any size wire or rod up to $\frac{3}{8}$ inch round or $\frac{3}{8}$ inch square and band iron up to $\frac{1}{2}$ by 2 inches. Its small size and low price makes it possible to have more than one, mounted wherever convenient. Gauge can be set for repeated cuts of same length on both wire or band iron.

Write for further information and prices.

The Federal Foundry Supply Co.,
4602 East 71st St., Cleveland, Ohio

Howe Saw Sharpening Machine

An automatic sharpening machine for hack saw blades, band saw blades, circular saws, metal slitting saws, etc. has been put on the market by Howe & Son, Inc., Hinsdale, N. H. It is described as a high speed full automatic machine which will bring about great economies in industries using saw blades, and will help increase production by keeping saws and blades sharp.



According to the makers, it takes hack saws of any length, width or pitch; band saws of any size; and is equally proficient in sharpening hand or power hack saws, circular saws, or band saws for either wood or metal. Once adjusted to a given saw, it is said to be entirely automatic in operation.

Lyon Steel Work Bench

Lyon heavy-duty steel work benches are given a more diversified use by ad-

GROBET
ROTARY FILES
ground from the solid



Ask for Catalog WG

the most complete catalog of its kind, illustrating hundreds of rotary files hand cut, milled cut, ground from the solid; also diesinkers' burs.

GROBET FILE CO. OF AMERICA 3 Park Pl., New York, N. Y.

dition of several new and improved accessories.



The basic steel bench shown may be equipped with single drawer, 2 or 3 shift drawer units for multiple shift operations, half depth shelf, full depth shelf, back and end stops, foot rest, or full length bench riser. Channel type stringer illustrated is used only when bench has no shelf. Shelves and stringer are made in one piece for added strength and rigidity.

Benches and accessories are fully illustrated in 40-page catalog No. 331, just released by Lyon Metal Products, Inc., Clark St., Aurora, Ill.

Flexible Coupling Charts

A handy non-technical selector chart has just been issued by Lovejoy Flexible Coupling Co., 5001 W. Lake St., Chicago. It is designed so that anyone without technical training can easily and quickly find the right flexible shaft coupling for his use.

The chart shows the proper size, bore, coupling for his horse-power and rpm, the kind of load cushions, and the price.

Variable Speed Transmission Catalog

Ideal Commutator Dresser Co., 1441 Park Ave., Sycamore, Ill., has issued a 52 page catalog of recommendations, application data, photos, and engineering data.

It gives a quick index source of reference for complete data for Ideal variable speed pulleys, variable speed transmissions, automatic tension control motor base, as well as sizes, rated capacities, design and operating details of application and installation.

SCRAP — ? Recover it with the TORNADO

Portable Industrial Vacuum Cleaner



QUICKLY picks up chips, dust or water. Cleans walls, beams, machines, floors, boiler tubes and tops, molds, etc. Powerful—portable. A real one-man unit. Weighs only 40 lbs. Dirt capacity, 12 gallons.



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FREE TRIAL OFFER

**BREUER
Electric Mfg. Co.**

5118 N. Ravenwood Ave., Chicago, Ill.



TORNADO

**5000
SHAPES AND SIZES
GROBET Swiss Files**



Ask for Catalog WF.

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss Files. Ask also for catalog WM on files for filing machines.

Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability.

GROBET FILE CO. OF AMERICA 3 Park Pl., New York, N. Y.



The Standard of QUALITY

All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

As Cutter Specialists since 1919 we are able to offer the highest *quality* and *service* at *attractive prices*.

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Few Territories Open.

QUALITY TOOL WORKS
Market St., Waukegan, Illinois

Standard Since 1911



**INCLINABLE
POWER
PRESSES**

Write
for
Literature

L & J PRESS CORP.

SUCCESSORS TO Loshough-Jordan Tool & Machine Co.
1625 STERLING AVE. ELKHART, INDIANA

Magni-Ray Folder

George Scherr Co., 122 Lafayette St., New York City announces a new 4 page folder describing Magni-Ray, an illuminated magnifier especially developed for close inspection of small parts entering into war production. The folder describes Magni-Ray in use for all types of inspection of riveting, welding, repair, and maintenance work, small screw machine parts, stampings, spark plugs, etc.

Beaver Issues Catalog

The new 28 page catalog of Beaver Pipe Tools, Warren, O. is now ready, covering their complete line of portable pipe, bolt cutting, and threading machines; portable pipe, bolt cutting and threading power drives and power units; pipe cutting and threading tools, $\frac{1}{8}$ to 12"; pipe reamers; vises; sawing vises; grooving and beveling tools; and threading oil.

The book is completely illustrated, and detailed information concerning each item and its use is given.

Safety Equipment Catalog

Pulmosan Safety Equipment Corp., 176 Johnson St., Brooklyn, N. Y. has issued four new bulletins describing their line of safety equipment. There are special booklets on protective clothing for welders, respirators, gas masks, goggles and eye shields.

A larger bulletin describes these as well as carboy trucks and tilters, Ply skin cream for preventing dermatitis, neoprene rubber gloves sleeves and aprons, and acid buckets and dippers.

NUMBERALL Numbering Machines

*Automatic and
Hand Operated*

for stamping in Metal, Fibre, Plastics, etc. Do faster and better work than Single Steel Stamps.

For Marking Metal Parts, Name Plates, Metal Checks, etc.

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NUMBERALL STAMP & TOOL CO., Inc.
Huguenot Park. - - - Staten Island, N. Y.



"TRU-V" BLOCKS



Why Not Save Time—by having enough V-Blocks available at all times in your shop to avoid the delays involved in make-shift set-ups and tie-ups?

"TRU-V" Cast-Iron Blocks are available in nine sizes—from $3\frac{1}{2}$ to 10", in three styles. Each block is carefully machined on all sides, with close limits held within .001" where required. A machined ledge on both sides provides for clamping on machine bed.

*Let us send descriptive bulletin.
Or contact your mill supply dealer.*

Oliver Motorcraft Corp.
2532 S. Wabash Ave., Chicago, Ill.



SAVE Labor and Time

Eliminate
heavy lifting.
Cut handling
costs. Table

swivels and locks in any position. Can be varied $15\frac{1}{2}^\circ$ by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

*Send TODAY for illustrated
catalog No. 2.*

MIDWEST TOOL & ENG. CO.
112 Webster St., Dayton, Ohio

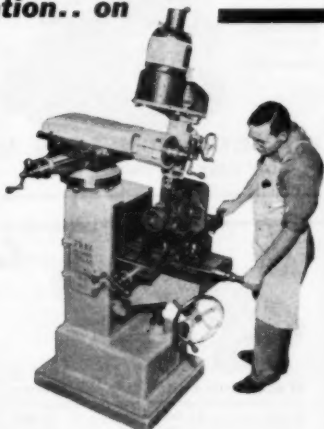
ONE WORK SET-UP *Handles Every Angle* or Compound Angle Operation.. on

FRAY 7-B UNIVERSAL MILLING MACHINES

- ★ You can handle every milling, drilling, boring, grinding job—at any angle or compound angle—in horizontal and vertical planes—without changing the work set-up.
- ★ On a Fray "All Angle" Milling Machine you have 10 inches of cross travel above the table. The Turret Head is $11\frac{1}{2}$ " in diameter, machine calibrated.
- ★ The Head can be rotated a full 360° in both planes, for any angle or compound angle. The Ram has 10° of in-and-out movement.

FRAY MACHINE TOOL CO.

501 W. Windsor Road Glendale, California





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Motor Driven Precision Cutter Grinding Machine

For precision Grinding
Formed Milling Cutters
used in the manufacture
of rifles, pistols, etc.

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New Britain UNIVERSAL VISE

Swivels 360 degrees horizontally,
100 degrees vertically, to
give any angle or com-
pound of
angles.



Write for
Further
Information.

NEW BRITAIN TOOL & MFG. CO.
NEW BRITAIN, CONN., U. S. A.

Clutch Bulletin

Morse Chain Co., Detroit, announces a new 6-page Indexing and Free-Wheeling Clutch Bulletin No. K-6 covering clutch applications for indexing, free-wheeling, and backstop operations. It shows how closer tolerances and rate of feed can be increased in drive feed roll indexing operations such as punch-ing, forming, shearing, etc.

Clutch backstop installations are given for maintaining directional shaft rotation. Explanations are given of practical, efficient, multi-engine combinations, plus other single and multi-ple prime mover hook-ups for driving a common load. How clutches auto-matically function in such installations is also told. It also gives diagramed and charted engineering data including power-speed ratios, load capacities, complete dimensions, and prices.

Pyrometer Booklet

A concise explanation of how the na-tional defense program affects pur-chase, use and maintenance of tem-perature measuring and control instru-ments is given in a 6-page Defense Bulletin No. 1, issued by Wheelco In-struments Co., Harrison & Peoria Sts., Chicago.

It is designed to aid all users of py-rometers, regardless of make, to main-tain equipment so it will operate effi-ciently and give uninterrupted service. It suggests substitute materials that may be employed in place of materials made critical because of the war pro-gram, and compares the properties of the original and substitute materials.



GOOD NEWS!

for DIE MAKERS

Transfer Points Eliminate
Guesswork in Die Making

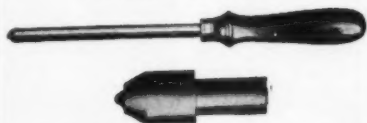
There's no chance for error when you use transfer screws as markers in setting dies. Points are of uniform height above hex base. Six accurately made and hardened screws nest in a special holder with hex wrench tip. Made in $\frac{1}{4}$ " to 1" diameters.

3/16" \$1.50 per set	5/16" \$1.25 per set	7/16" \$1.40 per set
1/4" 1.20 " "	3/8" 1.35 " "	1/2" 1.50 " "

HEIMANN MFG. CO.,

URBANA, OHIO

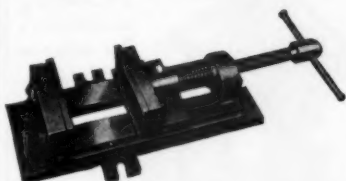
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We can supply you with best quality diamonds in any size and type of mounting, also promptly remount your diamonds.

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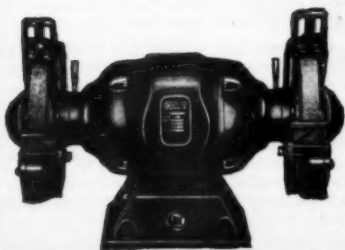
We manufacture a complete line of vises, including Machinists', Filers', Welders', Production and Drill Press and Milling Machine.

Ask for catalog and name of your nearest dealer.

The DESMOND-STEPHAN MFG. CO., Urbana, Ohio

BALDOR BALL BEARING GRINDERS

STURDY BUILT
for Long, Hard Service



ASK FOR BULLETINS ON COMPLETE LINE

Above: Baldor Special Carbide Tool Grinder, 1/2 h.p. ball-bearing motor, 6" Silicon Carbide wheels; **\$95.00**
Ask for Bulletin 305;

At left: BALDOR No. 804, 3/4 h.p. ball-bearing motor, 8" wheels; **\$60.00**
Ask for Bulletin 307;

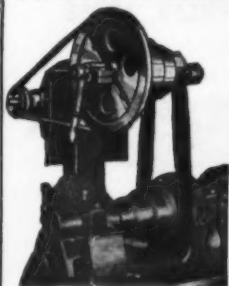
BALDOR ELECTRIC COMPANY
4368 Duncan Ave., St. Louis, Mo.

STEEGE MOTOR DRIVES FOR DEFENSE GUARANTEED FOR FIVE YEARS

No chance of breakdown, doing a good job powering machines for defense production. No noise, floating cone, results 100% power. 8 years of production proof of durability. Easily installed.

PRICED AT \$40. AND UP. FOR LATHES, SHAPERS, MILLERS, ETC. IMMEDIATE DELIVERY. Send for descriptive pamphlet.

W. L. STEEGE MACHINERY CO.
548 W. Monroe St., Chicago, Ill.



YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, inches	Open inches	Weight Pounds
1D	3 1/2	3 1/2	12 1/2
2D	5	5 1/2	23

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

YOST MFG. COMPANY
1335 SO. MAIN ST.
MEADVILLE, PENNSYLVANIA

Industrial Model Acousti-Booth

To conserve steel needed for war effort, Burgess Battery Co., Acoustic Division, 520 W. Huron St., Chicago, has developed a new line of Acousti-Booths, constructed of heavy reinforced birch plywood, specifically designed for industrial use. The new booth is available, without priorities, to all users, because no critical materials are used in its construction.



Walls and ceiling consist of perforated, reinforced panels, filled with a thick blanket of sound-absorbent material. The perforated acoustic panels blot up stray noise and create a "zone of quiet" in booth.

Like other Burgess Acousti-Booths, the new Model 207 provides a quiet place for telephone users in factories, power houses, or other noisy industrial locations. Thus, errors due to confusion in 'phoned orders are eliminated. Burgess Acousti-Booth has no door because it needs none. Factory racket is said to be absorbed so completely by the lining of the booth that telephone calls can be made in the noisiest locations without interference.

Conversation within the booth in ordinary tones cannot be understood outside the booth, thus assuring privacy. Its open, doorless construction provides better ventilation than ordinary enclosed booths. There is practically no maintenance, because there are no locks, hinges, or other mechanical parts to get out of order. Use of rounded corners and other design features keep this booth from being marred too easily when used in busy shops or factories.

New Magni-Focuser Binocular EYE-SHADE



For close Inspection
Accuracy - Precision
In all Industries

AN EYE AID FOR EVERY TRADE

- Five power optical lenses
- Allows free use of both hands
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- No focusing and adjustments required
- Fits over regular eye glasses
- Prismatic lenses reduce eye strain

MONTGOMERY & COMPANY, INC.

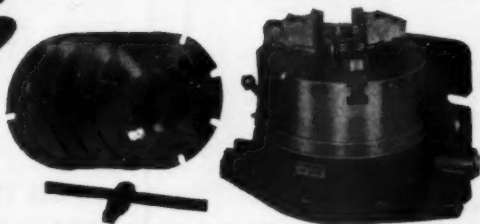
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NEW YORK CITY



SUPER SPACER



The Super Spacer, with its attachments and fixtures, has proven to be a tool of exceptional value for the rigid control of accurate machining operations. It is adaptable for Milling, Drilling, Grinding, Jig Boring and Slotting, at feeds and speeds limited only by the capacity of the holding means and the power of the machine.

Write for detailed information.

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD — CONN.

Lewis Semi-Finished BENCH MILL A PRECISION MILL AT A SENSIBLE PRICE!

Ideal for many uses. All major machining operations finished to high degree of accuracy. Perfectly designed, shop-tested, trouble-proof construction. Exceptionally



efficient. Stands severest service. Handles full range milling work. Table $3\frac{1}{2}'' \times 18''$, travel 12", cross feed $5\frac{1}{4}''$, vertical 7". No. 3 Morse Taper in spindle. $\frac{3}{4}''$ center hole adaptable for collet attachment. Complete — including materials, blueprints and LEWIS COUNTERSHAFT castings.

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for new 1942
Catalog.

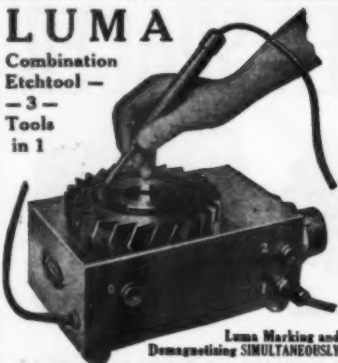
LEWIS MACHINE TOOL COMPANY

P.O. Box 116, Sta. A, Dept. 7-16

Los Angeles, Cal.

LUMA

Combination
Etchtool —
— 3 —
Tools
in 1



Luma Marking and
Demagnetizing SIMULTANEOUSLY

Writes on hardened steel — demagnetizes at the same time — with carbon point does light spot annealing and soldering jobs. Compact — easy to use — dependable.

Send for details — 5-day FREE TRIAL OFFER!

Luma Electric Equipment Co.
Dept. H — Main P. O. Box 132, Toledo, Ohio

Electric Gaging Booklet

Booklet GES-2543, recently issued by General Electric Co., Schenectady, N. Y., tells in an interesting and concise fashion of 11 outstanding instances where savings in both time and money, and at the same time improved quality, have resulted from the application of extremely sensitive yet sturdy electric gaging equipment.

The booklet illustrates such electric gages as the strain gage, pressure gage, film-thickness gage, eccentricity gage, profile gage, electrolimit gages, and the tensiometer. Uses of each are also suggested.

1942 Plomb Catalog

The Plomb Tool Co., 2209 Santa Fe Av., Los Angeles, Cal., announces its 116 page 1942 catalog containing listings of more than 1200 kinds of fine forged tools for use in all industries. Large and detailed illustrations of tool boxes and kits, sockets and attachments, wrenches, screwdrivers, pliers and other miscellaneous types of mechanics hand tools are included.

Shipbuilding Terms

A new 61 page book by this name has just been issued by American Technical Society, Drexel Av. at 58th St., Chicago, for sale at 50c per copy. It presents a complete glossary of ship terms, locations, and abbreviations, applying to tankers, cargo vessels, destroyers, and mine sweepers. In addition, there are four drawings showing and labeling all the parts of a typical cargo ship. The book is of handy pocket size (5x7") and is intended for Training Classes in Shipbuilding Occupations.

FOR DEFENSE SAKE

DON'T DISCARD YOUR WORN REAMERS.

**WE RESTORE THEM TO
ORIGINAL DIAMETERS**

ALL STANDARD HIGH SPEED STEEL

REAMERS WITH STRAIGHT FLUTES

DIAMETERS $\frac{1}{4}$ TO 3 INCHES.

THEY WILL REAM MORE HOLES AND

COST LESS THAN NEW ONES

Abrasive Engineering Corp.
Spring Lake, Michigan

TEAM WORK WILL WIN FOR THE U.S.A.

SCHAUER SPEED LATHES

..... are helping to produce faster and better for the munition factories the war supplies needed by our military forces. All are working together—the tool maker—the munition maker—and the men using the tanks, planes and guns. Such teamwork will continue to give us more victories to win the war.

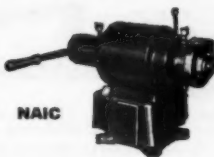


NAIB

SCHAUER SPEED LATHES
burnish, polish, lap and burr
machine parts.

Manufactured by

"the originators of today's Speed Lathes"



NAIC



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SCHAUER MACHINE COMPANY

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QUALITY GUARANTEED!

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LINE OF FLEXIBLE SHAFTS,
SAWS AND HOLE CUTTERS.

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ALL ALLOY PORTABLE SHEARS

FULLY
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Two Sizes

No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to $\frac{3}{4}$ " steel plate.

Special Blades for shearing stainless steel.

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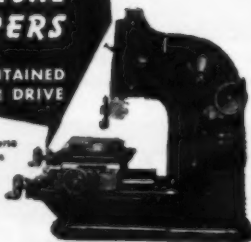
Accurate, High-Speed

MOREY VERTICAL SHAPERS

SELF-CONTAINED
MOTOR DRIVE

power rapid transverse
feeds in all directions

Tapered
Roller Bearings for
Spindle—all
others anti-friction.



8" STROKE
12" STROKE

Built to highest accuracy standards the MOREY VERTICAL SHAPER is simple for tool-room manufacturing. Power feeds and power rapid transverse feeds in all directions are instantly available in all operating positions.

Ask for Circular 726

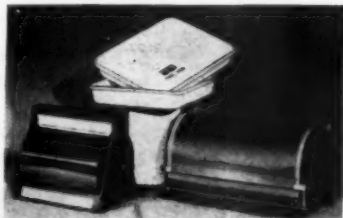
MOREY MACHINERY CO., INC.

410 Broome Street

New York, N. Y.

Apeco Copy Duplicator

A handy machine for duplicating any kind of copy up to 18x22" is the Apeco, made by American Photocopy Equipment Co., Dept. C, 2849 N. Halsted St., Chicago. It is especially recommended for making accurate, rapid copies of blueprints, priorities, specifications, bids, mechanical diagrams, etc.



No dark room is required—normal factory light will work well. The material to be copied is placed with a piece of Apeco paper on the surface of the machine. After exposing for a few seconds, it is placed in the developer for half a minute, and then immersed in a tray of fixer for several minutes. No special knowledge is required to operate the machine.

One copy can be made in 3 minutes, and 120 copies per hour can be produced, it is said. Material printed on both sides can be duplicated, and pages from a book or magazine can be copied without removal.

A six page booklet describing Apeco is available.



Workman, Spare Those Small Drills! Make them last as long as possible!

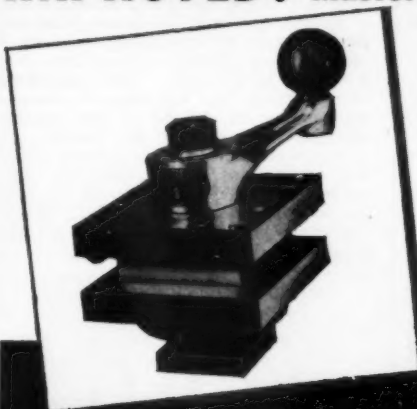
Put them to work with The Muchlamm Drilling Machine for drilling small holes .004" to .220" diameter

See how . . .
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THE HAMILTON
MUEHLMATT
Super Sensitive
DRILLING MACHINE

THE HAMILTON TOOL CO.
Ninth and Hanover Streets.
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IMPROVED! Mastercraft Turret Tool Post



**Always A Superior Tool
...Now Greatly Improved**

Faster action for top production — Hardened throughout, for longer service — Self compensating for wear in hard use — Precision built for accuracy.

The new Mastercraft Turret is a fast indexing 4-way tool post for repeat operations on the engine lathe or for front cross slide on the screw machine. Especially designed for use on 9" and 10" South Bend Lathes, Sheldon, Clausing, Atlas, Logan and similar bench lathes and small screw machines.

Order through your jobber or write for literature.

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Manufacturers and Selling Agents



NICHOLSON EXPANDING MANDRELS

★ *step-up production
to war-time efficiency*

Economy tools... for holding work while being machined between centers on lathes, grinders, millers, shapers, etc. Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin.

TYPE A—STEP JAW DESIGN

Size	Range Bores Taken	Net Price
1A	1/2" to 1"	\$12.00
2A	1" to 1 1/2"	16.00
3A	1 1/2" to 2"	23.00
4A	2" to 3"	34.00
5A	3" to 4"	40.00



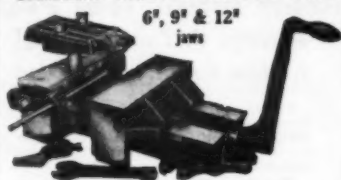
TYPE B—STRAIGHT JAW DESIGN

Size	Range Bores Taken	Net Price
1X	1/2" to 9/16"	\$10.00
2X	9/16" to 21/32"	11.00
3X	21/32" to 3/4"	12.00
00	3/4" to 7/8"	14.00
0	7/8" to 1"	16.00
1	1" to 1 1/4"	18.00
2	1 1/4" to 1-9/16"	21.00
3	1-9/16" to 2"	29.00
4	2" to 2 1/2"	40.00

Other sizes taking up to 7"
(Prices subject to change)

W. H. NICHOLSON & CO., 117 OREGON ST., WILKES-BARRE, PA.

GRAHAM MULTI-PURPOSE VISE



**Sold with or without the
Jig Attachments shown**

Finished flush to accurate parallels and right angles, fitted with Jig Attachments if desired, this Vise is extra handy for general machine work, and a jig-saver for repeat operations on miller, driller, planer, shaper, grinder. Request illustrated price circular.

*Jig Attachments can be
added at any time*

GRAHAM MFG. CO.,
56 BRIDGE ST. EAST GREENWICH, R. I.

LITTELL Air-Blast Valve



**for
Faster
Safer
Production**

PAYS its cost in a few weeks time in — increased production — greater safety — economy of air. Automatically ejects pieces. Operator's hands are never in danger zone. Quickly adjustable air nozzle.

Automatic Roll Feeds—

dial feeds, magazine feeds, hopper feeds, for punch presses. Reels for coiled stock. Send for Circulars.

F. J. Littell Machine Co.
4153 RAVENSWOOD AVE., CHICAGO, ILL.

National Standard Screw Gauge

The Dayton Rogers Mfg. Co., 2830 13th Av. S., Minneapolis, Minn., offers a handy American National Standard Screw Gauge for calibrating both wood and machine screws, in sizes from No. 1 to No. 12 inclusive. This recording caliper gauge has two sets of graduations. One on the left of the angular slot instantly records the number or size of wood and machine screws, while the graduations on the right instantly record the diameter size of various round stock from $1/16"$ to $1/4"$. While the gauge is graduated in $1/16"$, a $1/64"$ graduation is easily estimated.



The gauges are accurately made from .165" thick good quality flat steel carefully die cut to size and are finished to prevent rusting. The gauge is approximately 3" long by $1\frac{1}{8}"$ wide. This handy combination screw gauge and recording caliper will be sent on request on your company's letterhead.

NEW LOW COST DRILL GRINDER

Anyone can do expert drill grinding with this simple-to-use drill grinding attachment—fits on any bench grinder—saves buying new twist drills—saves time



and materials that dull bits waste. Grinds bits from $3/16$ to $1/4$. Write for FREE literature.

T & H MFG. CO.
811 E. 31 St.
Kansas City, Mo.

Electron Microscope

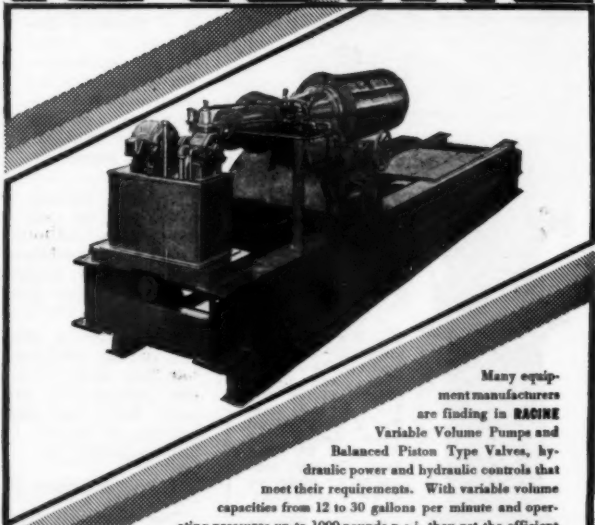
How the electron microscope is revealing the mechanism by which metals harden was told recently by Dr. David Harker, of the General Electric Research Laboratory, at a meeting of the American Institute of Electrical Engineers.

This new microscope, he explained, uses electrons instead of light to form magnified images of minute things. Because electrons are many times smaller than light waves, details that are too small to affect the light waves do change the paths of the electrons, and produce an image. Thus, the magnifying power of the electron microscope is as much as 100,000 diameters, or 50 times that of the older type, Dr. Harker declared.

He explained how the electron microscope is permitting science to find out what happens when metals harden.

"If rapid progress is to be made in developing alloys which will withstand the severe operating conditions they encounter, for example, in airplane engines, or in high speed marine turbines, it is necessary to know what happens as the various types of crystals form as the metal stands," he said.

RACINE



Many equipment manufacturers are finding in **RACINE** Variable Volume Pumps and Balanced Piston Type Valves, hydraulic power and hydraulic controls that meet their requirements. With variable volume capacities from 12 to 30 gallons per minute and operating pressures up to 1000 pounds p.s.i. they get the efficient power they need for closing dies, metal forming, plastic moulding, die casting and many other uses. Above is a pay off reel manufactured by the Aetna Standard Engineering Company, and controlled and operated by **RACINE** Hydraulic equipment. Write for information today on the full **RACINE** line and for engineering data in your particular requirements.

RACINE TOOL AND MACHINE COMPANY
1754 STATE ST., RACINE, WISCONSIN

"Unfortunately, the best optical microscope does not show the early stages of change which other tests indicate are taking place in these alloys."

Dr. Harker said that one of his first results was a determination of the structure of martensite. This is made by chilling heated carbon steel very rapidly, and it is used in lathes and other machine tools for cutting metal at high speed. He found that the martensite consists of alternate plates of iron and iron carbide.

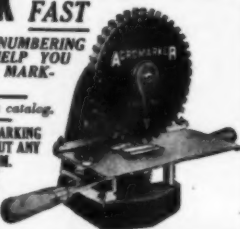
ACROMARK FAST

MARKING & NUMBERING
MACHINES HELP YOU
DO A GOOD MARK-
ING JOB.

Write for latest catalog.

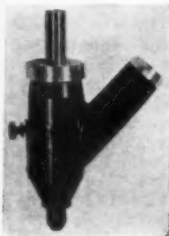
CONSULT OUR MARKING
SPECIALISTS ABOUT ANY
MARKING PROBLEM.

THE ACROMARK
CORPORATION
259 No. Broad St.
Elizabeth, N. J.



Closer Tolerances

The Center Scope made by the Center-Scope Instrument Co., 633 S. LaBrea Ave., Los Angeles, Cal., is a standard designed for locating on jig borers, vertical milling machines, lathes, drilling machines, and various inspection racks.



Through its use, it is claimed closer tolerances on any machine tool can be obtained without technical training or without sacrificing speed. It is also said that its accuracy does not vary when different men use the instrument.

A bulletin is available which gives full details concerning the instrument, together with pictures showing it in use, establishing an accurate starting point from two edges on a jig borer, locating a layout to the center of a lathe spindle, etc.

Ferner Bulletins

Two booklets by the R. Y. Ferner Co., 131 State St., Boston, Mass. are now available on the Chevenard Micromachines for photographic registration of tensile strength and other physical qualities of metals, as well as chemical composition. The other bulletin deals with Micro-mechanical study of welds.

HYBCO TAP GRINDER

If you can't get delivery on New Taps why not get real life and service out of your old ones?

The HYBCO Tap Grinder—for sharpening Chamfer, Flutes and Spiral Points. Series 600 has a capacity from No. 2 to $\frac{1}{8}$ " Hand Taps. Series 700 No. 4 to 1" Hand Taps. Chamfer controlled by adjusting screw in head. Special Heads for Left Hand Taps can be supplied. Reasonable Deliveries.



Write for Descriptive Bulletin No. H. B.

HENRY P. BOGGIS & CO.

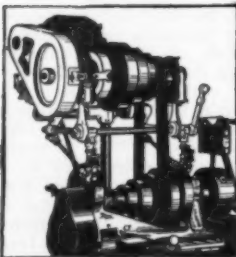
210 ST. CLAIR AVE. - CLEVELAND, O.

QUICK SPEED CHANGES

Speed changes are made without removing tool from cut where Remco Drives are installed. Less down-time. More out-put. No tool marks! Safe! No noise! Shockless! Motor takes hold gradually by slipping belt—simple friction-clutch action. Remember, Remco is the only drive on which the motor may be changed instantly if "burnt out." Get Free folder. Remco Products Corp., State St. at R. R., York, Pa.

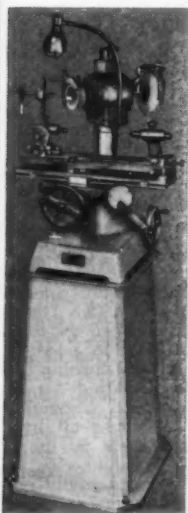
REMCO MOTOR DRIVES

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.



K-O Pedestal Models

An improvement has been made on the Model A600 Tool and Cutter Grinder, manufactured by the K. O. Lee Co., Aberdeen, S. D. This is the addition of a pedestal stand for the grinder which has previously been sold as a bench model only.



Designed especially for sharpening straight, spiral or angular milling cutters and face or form milling cutters up to 6 1/4" in diameter; straight taper, spiral or helical reamer and splitting saws up to 2 1/2" in diameter; the machine is also employed for production purposes in quite a number of munitions plants.

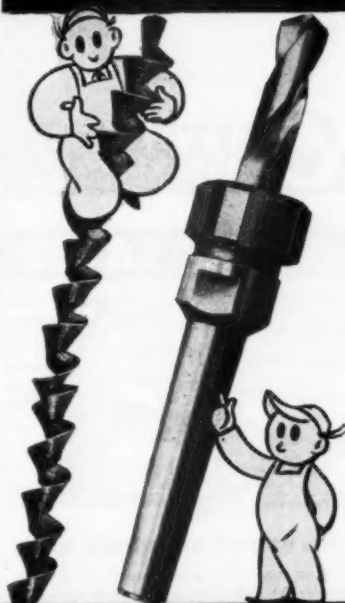
The two hand wheels which raise or lower the motor head and two clamps which lock it in place, permit the operator to stand at either side of grinder, adjust motor head to the proper elevation, lock it by means of the nearest clamp and proceed with the work.

The electrical connection panel is a further improvement over the long cord furnished with earlier models. This permits the user to make his own arrangement for wiring leading up to base of machine. A drum type reversing switch permits rotation of two grinding wheels, mounted on either long or short end of motor shaft, in either direction.

Further specifications: distance between centers 16"; swing over table 6 1/4" (8 1/4" when using special V-raising blocks); longitudinal table movement 11", cross feed 3 1/2"; vertical feed 7". The motor is 1/4 hp, 3,450 rpm,

LOOK AT THIS CHIP!

A 2-inch diameter drill in a Universal collet chuck turning only 160 revolutions per minute cut the chip here illustrated. And during this drilling operation the drill did not slip in either a longitudinal or radial direction in the collet chuck. In addition to gripping as strong as solid steel itself, Universal chucks have ground threads and ample room for tool feed out. Write for further facts and prices.



UNIVERSAL
Engineering Company
Frankenmuth, Mich.

*Lead screw ground
from the solid
AFTER hardening*

SMOOTH and compact. Constant accuracy. Parts subject to wear are hardened. Large offset adjustment eliminates need for offset boring bars. Lead screw is hardened tool steel. Its threads are ground from the solid AFTER hardening.

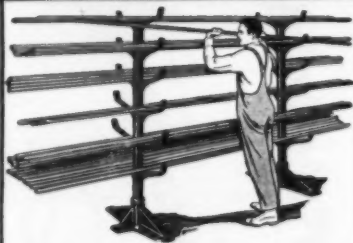
Criterion heads are unexcelled in accuracy, in ability to withstand constant use. Two sizes 1½" and 3". ¾" and 1" bar capacity. Order from your dealer or write direct. Request free literature. No obligation.

CRITERION
Boring Head



CRITERION
MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

A TIME SAVER



The BROWN SECTIONAL RACK

saves the time wasted end-hauling stock from the old-style, closed-side rack and quickens the selection of sizes by greater visibility. Built of standard metal sections: can be expanded for changes in stock or growth of business. Made in 5 styles: can't burn, depreciation practically nil.

SEND FOR BULLETIN No. 26-B

BROWN
ENGINEERING CO. 126 N. THIRD ST.
READING PA

single-phase, 110 volt a-c, in dust-proof housing.

Catalog literature completely describing this item is available. Also a new bulletin (CBG-42) giving explicit instructions on the grinding and finishing of carbide tipped tools.

Neat Trick Saves Pilots from Glare

Before the aircraft pilot is a score or more of indicator lights. If they are bright enough to be clearly distinguished as on or off during a bright day, they will blind him at night if he shifts his gaze from the inky blackness outside to the cockpit. One remedy has been to control the brilliance by inserting resistance into the circuit, but this has required rheostats as bulky and heavy as the lamps themselves.

A method of brilliance control developed by Westinghouse adds neither weight nor bulk to a crowded instrument—or radio—control board. Two layers of Polaroid are placed between the bulb and the lens; one is fixed in position, the other can be rotated by turning the lens. The stationary Polaroid screen polarizes the light in the horizontal direction, say; i. e., it blocks all light waves from the lamp except the horizontal. The rotatable Polaroid can be oriented to allow the horizontally-polarized light to come through, or, when turned 90°, to block them. Thus the pilot can obtain from the indicator light, any brilliance from full brightness to almost complete darkness by simply rotating a collar on the indicator.

SOLID OAK OR POPLAR GS MACHINISTS TOOLCHESTS

Also leatherette-completeline. The right type of chest for every mechanic from higher grade to more reasonably priced.

BEFORE ORDERING ANY TOOLCHEST, write for our literature.

Geo. Scherr Co.
122 Lafayette St.
New York, N. Y.



Employee Suggestions

In 1941 G-E Co. paid its employees \$95,203 for 12,453 suggestions, a large percentage of which were ideas for speeding or improving war production work.

A total of 40,834 suggestions were received last year, 24% more than the previous year. The number acceptable was 8% larger. Many employees took their awards in defense bonds.

Nearly 70% of the employees promoted to foremen in the past year were men who had made numerous suggestions. During the past 20 years, more than a Million Dollars has been paid for suggestions of more efficient ways of doing things.

Many firms in addition to having suggestion boxes for plant improvement, also have special "Win the War" suggestion boxes for their employees.

Some of the suggestions paid for by G-E included:—Elimination of the need for special tools at one point; speeding marine turbine work; ways to cut spoilage in the manufacture of transformers and other high voltage equipment; ways to save thousands of pounds of metal, especially copper, in circuit breakers.

THE JOHNSON FRICTION CLUTCH HAS FLOATING PLATES

THE NEW "MAXITORQ" MULTIPLE DISC DESIGN

...for better clutch
performance under
ANY CONDITIONS

More than thirty years of successful application of JOHNSON FRICTION CLUTCHES to practically all power transmission demands is behind every recommendation made by our Engineering Department.

You can, therefore, depend on better clutch performance regardless of the severity of operating conditions, when you bring your clutch problems to JOHNSON Engineers for study.

Among the operating features which contribute to better performance are sensitive starting, safety, cleanliness, quietness, efficiency and long life.

You incur no obligation in asking us to show specifically how you can improve power transmission on your machines. Just give us the details of your problem.

Write for Multi-Disc Clutch Catalog
No. B-4 or Consult "Sweet's"
or "Thomas' Reg."



Double

"Floating Plates"
in neutral



Single

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Other suggestions were for: — Improvements in calibrating radio transmitters; halving the time required for a step in making bearings and bearing rings for battleships; switch assembly improvement called by the suggestor "my shot at Hitler."

Others included: — Saving 12,000 pounds of special steel by cutting it in strips 7/32" narrower; saving strategic mica, in the assembly of a type of rheostat, etc.

Barrel Recentering Machine

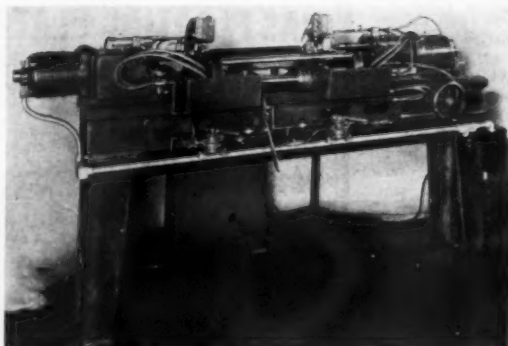
This Machine is designed to recenter, (for turning) both ends of gun barrels after drilling and rough reaming of bore. The operation is performed by locating from the bore so that the new centers will be concentric with bore regardless of the eccentricity of bore with the outside diameter of barrel.

The machine consists essentially of two automatic electric motor driven drilling heads with horizontal spindles mounted at opposite ends of a long narrow bed, the heads being mounted with the spindles in exact alignment in dovetail machined ways.

Directly in front of each head, mounted on the same ways, is a three jaw air chuck for holding barrels during recentering operation.

On front of machine, a pair of barrel loading arms are pivotally mounted on a square shaft. In the arm ends, in alignment with and opposed to each other are two air driven plungers, the ends of which are tapered and of a size to accurately fit barrel bore.

Closer to operator on front of machine are two adjustable Y supports for the barrels while they are being picked up by the plungers in ends of loading arms.



Barrels are discharged, after recentering, by opening air chuck and allowing them to roll out on a draining rack on back of machine.

No. 1 Machine recenters barrels of 3" bore and lengths ranging from 16 to 26".



Wrigraph PRECISION DRAFTING MACHINE

Brief Case Size Illustrated.

New large **INDUSTRO**
Drafters available — tubular arm,
ball-bearing machines. Complete
range of sizes up to 36"x48".

Free trial offer and catalog on request.

L. C. WRIGHT, INC.
6205 CARNEGIE AVE., CLEVELAND, OHIO

GET PEAK RESULTS WITH **GROB** DIE MAKING MACHINERY

"THE TOOLMAKERS' BEST FRIEND"



Compact, powerfully built, for rigorous shop service. Faster, more economical in operation.

Unmatchable performance for most difficult sawing and filing of tools and dies.

Write or wire for details and prices



GROB BROTHERS

GRAFTON WISCONSIN



NEDCO

Electric

SANDING—RUBBING MACHINES

SOLVE YOUR SURFACING PROBLEM

Rotary or Oscillating
types.



Write
for
circular.

THE NEDCO COMPANY
WALTHAM MASS.

PECO CLAMPS



QUICKER-STRONGER

The exclusive patented design of PECO Quick Action Clamps provides exceptional speed of opening and closing and assures a positive lock impervious to pressure and vibration. In models 1561 and 1514 handles are down out of the way when in the locked position, making it easier to get to work when machining, milling or fabricating.

In its full line of seventeen originally designed clamps PECO presents the only clamps with drop forged handles and clamping bars. Send today for catalog on PECO.

PRODUCTS ENGINEERING CO.

700 E. FLORENCE AVE., LOS ANGELES, CALIF.

LOWER PRICES— PROMPT DELIVERY

You save four ways when you order Willey's General Purpose Tools:

1. Lower prices, just announced.
2. Increased production.
3. Lower operating costs.
4. Prompt delivery saves down time.

Tipped with Willey's Metal, these tools are suitable for machining cast-iron, tough hard rubber, bakelite, fibre, and tough alloy steels.

Standard tools, in many cases, will handle 90% of your requirements. Special tools quoted on request.

Write for BULLETIN 142

Quotes new prices on all grades, sizes and classifications of Willey's standard tungsten carbide cutting tools and blanks, and Torpedo Type Wheel Dressers.

WILLEY'S



WILLEY'S CARBIDE TOOL CO.

1344 W. Vernor Highway,

Detroit, Michigan

ERICKSON AIDS DEFENSE

IN BUILDING

Trucks

General Motors
Int. Harvester
Chrysler
Willys

Precision COLLET CHUCKS for ELECTRIC AND AIR HAND DRILLS

U.S. Patent
No. 2,229,685

Makes stub drill of Jobbers
Drill. Less Drill breakage.
Quicker, more accurate.
Grips on Flutes as well as
on Shank.

Grips on 8 points instead of
customary 3 or 4.

Collet collapses 1/32 in.
Chuck Shank supplied for
any type spindle — male or
female.



Sizes, 1/2
inch dia. to
No. 80 Drill.



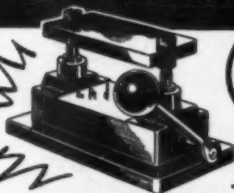
★ SEND FOR LATEST BULLETIN COLLET

ERICKSON STEEL COMPANY

80th & BESSEMER AVE

CLEVELAND OHIO

CUTS TOOLING TIME SPEEDS PRODUCTION



\$29.75

THE UNIVERSAL VISE

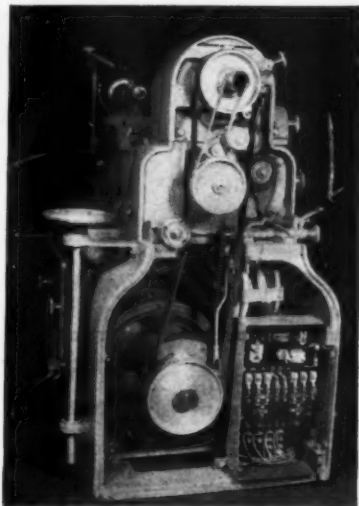
Loads and unloads with amazing speed—
lever locks work instantly—holds securely—
releases quickly. No complicated adjust-
ments—no costly drill fixtures needed—
just an inexpensive drill bushing plate
and adaptor for each job. Sturdily con-
structed—nothing to get out of order.
Quickly pays for itself. Only \$29.75
f.o.b. Chicago. Ten Days Free Inspection

Order **MOHR LINO-SAW CO.**
Today 130 N. Union Street, Chicago

No. 2 Machine recenters barrels of
3" bore and lengths ranging from 24
to 36".

No. 3 Machine recenters barrels of
5" bore and lengths ranging from 36"
to 46".

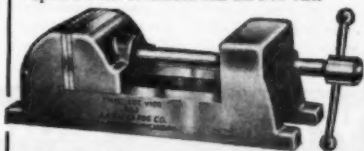
The maker is W. M. Steele Co.



The new all-electric, adjustable-
speed drive is so compact that the
Reliance V'S control set, lathe motor,
speed-adjusting rheostats, and panel
for relays, contactors, and switches,
can all be neatly concealed in the
base of the Monarch lathe.

DOUBLE YOUR DRILL PRESS CAPACITY

Minutes are Seconds with the new TWISTITE Vise.
Opens to full capacity in one second.
Speed Defense Production with this New Vise.



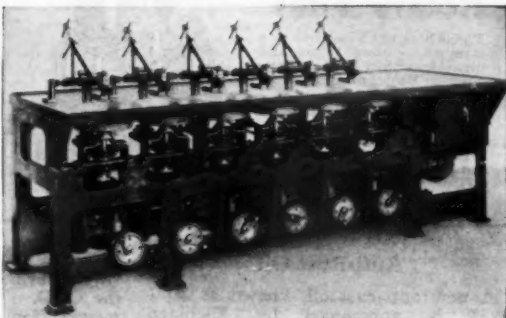
J. A. Richards Co., Kalamazoo, Mich.

Optical Grinding Machine

A new line of Lehmann optical grinding Machines has been announced by George Scherr Co., 132 Lafayette St., New York City. They are said to be of maximum range for readily producing a large variety of work.

Machines are of heavy construction for rigidity in operation. Adjustment of spindle and crank speeds is easily made by releasing pin stops in indexing discs and rotating cranks after disengaging friction described by hand levers.

Special attention has been paid to adequate lubrication of all bearing surfaces. An Alemite central lubrication



system is provided with easy accessibility from front. Grinders operate from 41.5 to 132.5 rpm, and three different polishing spindle speeds are available—76-243, 41.5-132.5, and 22.6-72.4 rpm.

EMERGENCY MEASURES *Effect* PERMANENT CURE

During the present emergency, when machine tools are not available, production can be appreciably stepped up on present equipment and better work produced through the use of Alco drill chucks, tap and die holders. Alco tools will work efficiently and accurately, on old as well as new machines to that perfection in screw machine work can be attained permanently.

Equip every available machine now with these improved Alco tools and speed national defense at the same time you are cutting costs and set-up and production time.

THE ALCO DRILL CHUCK —
No bushings required—No off-center drilling—No spoiled work—No time lost.

THE ALCO TAP HOLDER —
Makes taps last longer—No more tap breakage—No more bushing inventories to carry—No special size bushings to make.

THE ALCO BUTTON TYPE DIE HOLDER —
Full floating feature permits die to run over work before tightening flange—Perfectly concentric alignment—Makes dies perform uniformly and wear longer

THE ALCO ACORN TYPE DIE HOLDER —
Easy and quick set-up—Concentric alignment—No torn threads—No tapered threads—No work inspection necessary.

Write for catalog

THE ALCO TOOL CO.

835 Housatonic Ave., Bridgeport, Conn.
Detroit Office: 908 Stephenson Bldg.

ALCO TOOLS

EFFICIENT

Rotary Files

These files are available in a number of different styles and sizes, in either High Carbon Steel or High Speed Steel.

Send for catalog showing a wide variety of standard shapes and special shapes. Perhaps we have what you want in stock, if not, we can grind it.

The Rotary File Co.



Hand Cut

If you have need for special shape Files, we shall be glad to submit the desired File for your approval and trial upon receipt of a sample or sketch.

This service is designed especially for your convenience, for which we make no charge.

STRATFORD, CONNECTICUT

Anti-Rust Oil

A new anti-rust oil, known as Microil, is announced by Michigan Chrome & Chemical Co., 6350 E. Jefferson Ave., Detroit. Among its qualities is high flash point; for this reason, fire hazard is reduced to a minimum, according to the makers. It dries in 30 to 45 min., is light in color, and transparent, and does not alter the appearance of the part on which it is applied.

Microil is applied by hand dipping, and is of a consistency which is said to assure a uniform and effective protective film over the entire surface. It is claimed that once applied, it will provide constant protection until wiped off, or removed with a solvent.

It can be used on practically any surface which must be guarded from oxidation or corrosion. Aircraft parts, gages, precision tools, other machined or polished parts, stampings, etc. can be protected. It has been found to be extremely valuable in plating use

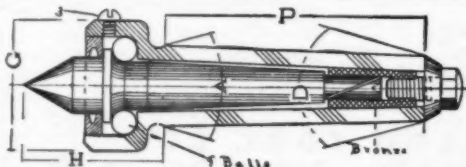
where a corrosive atmosphere is always prevalent. As an example, when the O. D. of a piece is plated and removed from the plating solution, the I. D. must be protected from corrosion immediately. Immersion in Microil protects the non-plated surface.

Drill & Reamer Facts

This is the name of an informative 32 page booklet just issued by Whitman & Barnes, 2108 W. Fort St., Detroit.

The Drill Facts section describes and illustrates design and construction of twist drills, correct drill pointing, and proper use and care of drills. Of special value are their recommendations of speeds and feeds, cutting compounds, and types of drill points to use.

Other information given includes:—hardness conversion table, tap drill sizes and basic thread dimensions, decimal equivalents of fractional, letter, wire gauge, and millimeter sizes, etc.



RIGID TOOL CO.,

months, and I got pay for several doz.

2000 Witherell St., Detroit, Michigan

Solicited Shop Foreman said: "I like your Live Center, but I cannot buy. But if you put one on that Crank Shaft Lathe, and it stands up for 30 days, I will see that you are paid for it". I did so, and it stood up for 29



CUT COST ON SMALL WORK. SPEED PRODUCTION — INCREASE SAFETY BY USING ROUSSELLE PUNCH PRESS
Manufactured By DAVID J. ROSS, BENTON HARBOR, MICH.

Your cost figures will Show that "PRESS TIME" runs high on your larger machines—Especially when producing small parts or in frequent set-ups for light work. Do your small jobs—odd jobs—special work—on a press that is designed and built expressly to save time and money in these operations. Safety devices such as Knockout BAR, the non-repeating clutch are standard equipment on this press without extra cost.

Specifications: Model 10 H, Shown in Cut

SPECIFICATIONS	
Diameter of main bearing and pin	1 1/2"x3 1/2"
Standard stroke	2"
Special stroke (at extra cost) maximum	3"
Top of bolster plate, front to back, right to left	11"x14 1/2"
Thickness of bolster plate	1 1/2"
Bed to slide, stroke down, adjustment up, (Standard Stroke)	"
Top of bolster plate, stroke down, adjustment up	"
Depth of throat, ram center to frame	5"
Weight of Flywheel	150 lbs.
Speed of Flywheel	200 R.P.M.
Weight complete without skids, (approximately)	975 lbs.
Pressure at bottom of stroke	15 tons
Size of hole in ram for punch shank	1.9/16"
Motor speed and horsepower required	1750—1/2

IMMEDIATE DELIVERIES—for further information write
CULLMAN HUBER SALES CO.
22-13 Steinway Street Long Island City, N. Y.

The Need for Subcontracting

It is said that each day's war production now is worth ten a year from now. As the War Production Board needs the help of almost every machine shop and plant throughout the country, do not assume that you have no chance of getting war contracts.

They are doing as much as possible to help small manufacturers find subcontract work, but they cannot take all the responsibility of obtaining the work for you. Small manufacturers are slow to realize that getting war work requires the same resourcefulness showed in founding and building their businesses.

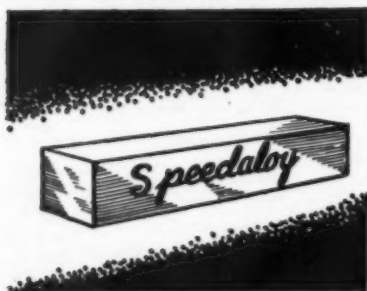
The first step necessary is to make a complete survey of your facilities to find just what you have available for the main prime contractor's use. Begin with your business record, include a description of normal products made in the plant, the experience of managerial and supervisory personnel, previous war production experience, a financial

statement, and names of past and present customers for reference. List the number of factory employees, their skills, peak employment in your plant for one, two, and three shifts, give a description of your available labor supply and the competition for it, together with a brief analysis of existing and nearby wage rates.

Take stock of your plant and its equipment, describing its location, transportation facilities, available power and water facilities, and similar production factors. Give complete layout plans with photographs of each section of your plant. Make a complete list of all tools with type, make, age, size, and serial number, as well as tolerances usually followed.

It is important that this survey be accurate and complete. Since it may be rather expensive, you should make the very best possible use of it when it is completed. The War Production Board suggests you send it to the following places:

FOR NATIONAL DEFENSE SPEED UP WITH SPEEDALOY TOOL BITS AND TIPPED TOOLS



SPEEDALOY

- SPEEDS UP PRODUCTION 50 to 150%
- SPEEDS UP CUTTING OPERATIONS
- SPEEDS UP COST SAVINGS
- SPEEDS AWAY TIME LOSSES

WHAT IT IS

SPEEDALOY is a cast, cutting material made up of a special tungsten chromium alloy. It fills the breach between high speed steels and tungsten carbides in both performance and price.

WHAT IT DOES

SPEEDALOY wears longer than high speed steel and resists shock more than tungsten carbides. It will machine all materials except manganese steel and chilled iron. It should be run faster with about the same depth of cut and feed as high speed steel — thus increasing production 25 to 75%.

SPEEDALOY has proven exceptionally effective on stainless and other nickel or chrome alloy steels.

SPEEDALOY can be supplied in tool bits, flats, and a wide variety of tipped tools available for immediate delivery.

Literature on request.



1. The nearest of the 115 field offices of the contract distribution branch of the War Production Board. Write the WPB in Washington for the name of the one nearest you. At one of these offices you can find out what war items are needed and which you can make.

2. The Army's district procurement offices. Write to the office of the Undersecretary of the War Department in Washington for a copy of "Army Purchase Information Bulletin" containing the addresses of the various procurement offices, the type of products they buy, and how to get orders.

3. The Navy's Bureau of Supplies and Accounts, Navy Dept., Washington, has available a booklet "Selling to the Navy" giving complete information.

4. Local prime contractors — firms which now have contracts, many of them need the facilities of smaller plants to help them fill their own contracts. Addresses and other information are available to bona fide manufacturers at Contract Distribution Offices mentioned above in 1.

BURKE MILLING MACHINES Make Fast Work of Small Jobs

Motor
Driven

Timken
roller or
ball bearings
to
spindle



*Write today for
circulars.*

Burke Machine Tool Co.
297 E. 16th St.,
Conneaut, Ohio

Por-Os-Way Grinding Wheels

A. P. DeSanno & Son, Inc., 442 Wheatland St., Phoenixville, Pa., is introducing a new Radiac product—Por-os-way. This is a new type precision grinding wheel—produced by a new patented process. It is said that Por-os-way, properly used takes deeper cuts, breezing through .010" or more, also that it grinds much faster, increasing production per man per machine

2 to 5 times. The structure, instead of being "sandy" and compact is "stringy" and porous—resembling a sponge. Air cells allow the air to keep every grinding contact cool, yet it is claimed Por-os-way is hard, tough, holds the corner and requires little dressing—due to a new vitrified bond.

Por-os-way grinds hard alloys, copper, aluminum, wood, rubber, plastics and other soft materials with minimum loading.



ORIGINATORS

and exclusive manufacturers of DUBLIFE GAGES and UPPCO FINISH

DUBLIFE
PLUG GAGES LAST TWICE AS LONG
AS ORDINARY GAGES

"UPPCO FINISH"
ASSURES EXTREME HARDNESS
AND ACCURACY

The handle is made of hexagon material with bronze tapered collet which locks around the plug as it is driven into the handle. The plug are reversible, so that when one end is worn out the other end may be used, thus giving double life. 30,000 gages in stock ranging from .030" to 1".

Catalog showing DUBLIFE and other gages of American Gage design will be sent on request.

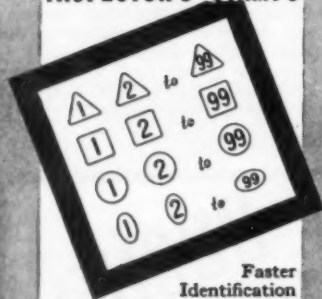
UNITED PRECISION PRODUCTS CO.

4618 W. HURON ST.,

CHICAGO, ILL.

New

INSPECTOR'S STAMPS



Faster Identification
of Inspectors or Operators.
Different borders may be used for different shifts. Available in 4 sizes. Write for prices today.

NEW METHOD STEEL STAMPS, Inc.

145 JOB CAMPAN

DETROIT, U. S. A.

Motor and Control Manufacture

The manufacture of motors and controls for general industrial use is described in a new 32-page catalog.

Designed to show the many phases of research, production, and testing of motors and controls, a number of photographs are used to illustrate most of the scenes that would come to the attention of a visitor going through this department. Mass production of precision parts, multiple dipping and baking, and foundry operations are among the procedures described and illustrated.

Line assembly and testing of controls is covered pictorially, showing how precision tools and gauges coupled with operator skill contribute to accurate and rapid production. Material handling layouts show use of conveyors and arrangement of parts for assembly.

A copy of booklet A-3023 may be obtained from department 7-N-20, Westinghouse Electric & Mfg., Co., East Pittsburgh, Pa.

NIELSEN Heavy Duty *Live Centers*

Write for catalog on live centers

Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

NIELSEN, INC.

LAWTON, MICH.

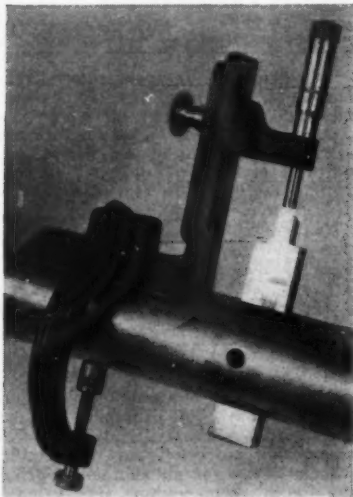
the hotel preferred hotel metropole

a stopping place modern in every detail, yet maintaining a friendly atmosphere and hearty hospitality • preferred by experienced travelers • dining room • garage adjacent • rooms from \$1.50 • with bath from \$2.50

cincinnati

Tool Setting Gauge

A new gauge for setting cutting tools in boring bars and many other uses has been developed by Bartelt Engineering Co., 1214 Partridge Ave., Beloit, Wis. It is available with both a dial indicator and micrometer head as shown.



Its use is claimed to save considerably in labor and machining time, elimination of oversize holes and trial boring, as well as scraping at time of assembly.

Ball Bearing Booklet

A new booklet "Interchangeable Ball Bearings for Replacement" issued by the New Departure Division of General Motors contains a listing of all standard New Departure Ball bearings together with the bearing numbers of competitors' bearings with which they will interchange. Because of potential shortages of bearings, this information is especially timely now.

The Booklet R, Form No. A-58 is available from the general office, United Motors Service, Inc., General Motors Bldg., Detroit, Mich.

New

A POWER FEED INTERNAL GRINDER

- Ex-Cel-O 35,000 RPM Spindle
- Power or Hand Feed
- Four Speed Power Feed Unit
- Precision Motorized Workhead
- Table Travel 10"
- Cross Travel 4"
- Grinding Capacity $\frac{1}{8}$ " to 3" Holes

SEND FOR THE GRENBY CATALOG



No. IG-10

GRENBY MFG. CO.

BLAIDVILLE, CONNECTICUT



Why Not Buy The Original Electric Etcher? **MARK IRON AND STEEL**

THE ETCHOGRAPH WAY

New ELKONITE TIP pencil.
New Baby Grand Model at a
lower price.

2,000
in use

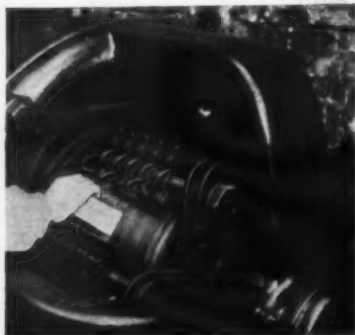
BREWSTER - SQUIRES CO.

42 Church St.,

New York, N. Y.

Ideal Announces Cleaning Stone

Due to heavy war production schedules, commutators are requiring more



attention—excess film and brush deposits must be removed if the motors and generators are expected to operate at peak efficiency.

To provide for this need, Ideal Commutator Dresser Co., 1441 Park Ave., Sycamore, Ill. has developed the new Ideal Commutator Cleaning Stone which cleans while the motor or generator is running. It is used by simply holding it against the commutator and slowly moving across the face.

According to the makers, it does not clog or cut the commutator, and in addition will also improve brush performance, reduce noise, even distribution of brush contact, drop and brush wear, and reduce chattering and sparking.

Bay-State Grinder Facts

An attractive new catalog has been issued by Bay State Abrasive Products Co., Westboro, Mass., giving many facts about the correct types of grinding wheels to use for all manner of grinding jobs, composition of grinding wheels, price lists, sizes, etc.

The catalog is graphically illustrated in cartoon style, as well as with many photographs of the broad line of Bay State products.



DIAMOND **TOOLS**

Diamonds vary in quality and it is important
to use the proper kind for a given job.
"Bargain diamonds" are not an economy.

If you don't know diamonds know your diamond dealer.
Our 45 years in this field merits your confidence.

ACME DIAMOND TOOL CO.
15 MAIDEN LANE, NEW YORK, N. Y.



GRIND-ALL

**ALL WET GRINDING OPERATIONS Are Greatly Improved with GRIND-ALL
THOSE FINISHES YOU HAVE LONG WANTED**

A CONCENTRATE, Immediately Miscible with your present grinding fluid or solution.

Saves time—Those frequent shut-downs for wheel dressing are lessened.

ORDER THRU YOUR MILL OR INDUSTRIAL SUPPLY JOBBER

If he will not stock or order for you—Send order to

Stadoil Manufacturing Company

Dallas, Texas

Los Angeles, California

Instruction Stickers

Production is said to be speeded up by a new type of dry sticker having a special adhesive substance that makes



it particularly adaptable for use in defense plants, according to the manufacturer. Because of their accuracy and quick application, they are especially valuable as inspection, rejection, instruction and identification stickers in defense industries. Sold under the trade name, Kum-Kleen Stickers, it

is claimed that they overcome many of the disadvantages of ordinary labels, tags and markings. They are applied quickly, without moisture, on any smooth surface, including polished metal, glass and plastics, by a slight finger pressure. Unaffected by heat, cold or humidity, they stick permanently, though they may be peeled off easily by hand without leaving a stain or mark. Manufactured by Avey Adhesives, 451 East 3rd St., Los Angeles, the stickers are available in assorted sizes, shapes and colors — printed or blank.

Norton Booklet

An attractive, colorful new booklet issued by the Norton Co., Worcester, Mass. describes the 3 types of Norton abrasives—Crystolon Vitrified bonded wheels, resinoid bonded diamond wheels, and metal bonded diamond wheels. It graphically shows the points of superiority claimed for Norton grinding wheels.



Plain Type

CLOSED

TRADE



CLOSED

MARK



Offset Type

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

**AUTO Moulding
& MFG. CO.**

**2326 S. CANAL ST
CHICAGO**

SPECIFICATIONS:
Open Width $\frac{1}{8}$ " to 6"
Gate Material .040 to .125
Pin Diameter .101 to $\frac{1}{8}$ "
Lengths to 120"

THREE-FOURTHS OFFSET.

SEMI-OFFSET

Mead Announces New Products

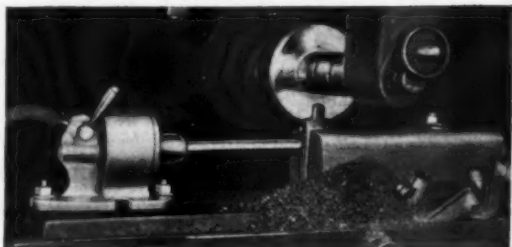
Mead Specialties Co., 15 S. Market St., Chicago, announces two additions to its line of air clamps. The additions, the H4 Air Clamp and a new Air Clamp Foot Control, were developed for a prominent aircraft manufacturer. These items are now available to all war contractors.

The clamp is a variation of the drill-press model, and is adaptable to many forms of milling operations. It also has wide application in assembly jigs. It is possible to operate groups of Air Clamps in assembly jigs by one master valve. Like the drill-press Air Clamp, the H4 produces a hold-down pressure of four times the line pressure.

The other item is a new type of foot control for the clamps. With it, work-cycles may be expedited as the operator's hands are released for more rapid feed of new work.



An important feature of the clamp is the ease with which it can be set for various operations. Jigs can be reduced to the simplest forms, while built-in clamps and hold-downs can be eliminated. The time and money saved in these operations often runs into astonishing figures. Due to the flexible pressure, variations in thickness of work (a frequent case of trou-



ble with castings) presents no problems to the Air Clamp.

Prestite Folder

For use as a substitute for some metals high on the priority list, Prestite, a porcelain material, is described in a 4 page folder, B-3081, announced by Westinghouse Elec. & Mfg. Co., Dept. 7 N20, E. Pittsburgh, Pa. Prestite is a different kind of porcelain which can be pressure-molded into intricate shapes and readily lends itself to low cost quantity production. Tolerances are guaranteed not to exceed 1/64" per inch regardless of size.

Mechanical strength as compared to cast metals are discussed, attention being given to pressure, temperature, and distortion characteristics. Chemical and electrical properties are listed with a note on flashover effect. A tabulation of physical data compares Prestite to wet and dry process porcelain with respect to dielectric and mechanical strength, resistance to heat shock and dimensional fidelity.



JFS - CUB

VARIABLE SPEED TRANSMISSION

For "A" section V-belts—3.3—1 speed range—perfect belt alignment in all positions. Priced so low that no shop or machine need go without infinite speed selection. See your dealer or write \$16.50

Standard Transmission Equipment Co.
Dept. MC. 416 W. 8th St. Los Angeles, Calif.

Vic Punch

Altho Ball Brasses are discontinued for the duration, their makers, Wm. Ball, Sr., at Hope Manor, West Chester,



Pa. are going full steam ahead with their Vic Punches and other tools for use in war production. The new punches are said to be finding wide use in light sheet metal on anything from gas masks to bomber parts.

Among the special features claimed for the Vic Punch are—equal efficiency as hand or bench press, stripping with-

out changing position of hands, operation in natural position without strain or tiring, protection of hands from sharp edges and punching, powerful combination of knee and toggle joint action, etc.

With the punch come six punches and dies in sizes $\frac{1}{8}$, $\frac{5}{32}$, $\frac{3}{16}$, $\frac{7}{32}$, $\frac{1}{4}$, and $\frac{5}{16}$ ". An extra mounting attachment is available for bench use.

Floor Cleaner

Speed-Dri is a new floor cleaner especially adaptable for industrial use. It is claimed to absorb oil and grease, giving an immediate anti-skid surface, and is non-inflammable. Thus it helps prevent spontaneous combustion and accidental falls due to slipping on the floor surface.

According to the makers, it removes stains when properly used, restores the original color of the floor, and eliminates odors. It is made by Refiners Lubricating Co., 601 W. 26th St., New York City.

Tool Maker's BENCH LAP SET

Time saving convenience for the tool and die maker. Complete set consists of 7 Copper Head Laps, 1 each of the most commonly used sizes— $\frac{1}{8}$ ", $\frac{7}{16}$ ", $\frac{1}{4}$ ", $\frac{7}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ ", $\frac{1}{2}$ " and two extra sleeves for each size, also black enameled die cast base and 6 ounce can of Copper Head Lapping Compound.



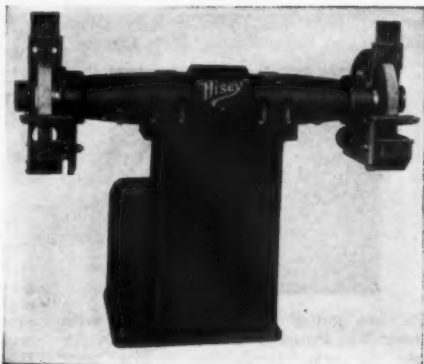
**Send For Your
Copy of Circular
Describing
Copper Head Laps**

Boyar-Schultz Corp., 2108-D Walnut St., Chicago, Ill.

Wide Swing Grinder

A new type FE Wide Swing Grinder is announced by Hisey-Wolf Machine Co., Cincinnati, O. According to the makers, its outstanding feature is the large spacing between wheels and almost unlimited working clearance around wheels, permitting the grinding of large, awkward pieces and irregularly shaped work.

The one piece tool or work rests are unusually heavy, and are easily adjusted or removed. Wheel guards pivot to any angle, have hinged covers, and standard exhaust system connections. Motor is mounted on rear of pedestal and a V Belt drive operates spindle.

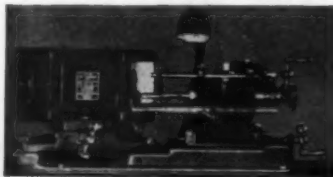


Plant Maintenance Hints

Because war conditions are rapidly multiplying equipment maintenance and plant sanitation problems in factory and mill machine shops, a special new five-page Digest which reviews

materials, methods and procedures successfully used for effectively handling 28 essential, commonly recurring maintenance jobs, has just been issued by Oakite Products, Inc., 57 Thames St., New York.

ACCURATE CHAMFER SHARPENING



With the **J-B Tap Grinder** you can sharpen 2-3-4- or 5-flute taps, right or left hand. Grind uniformly and accurately on any taper or angle of chamfer. Taps are quickly and accurately set.

Taps sharpened on the **J-B** stay sharp longer.

Send for additional information today!

EDWARD BLAKE CO.

635 COMMONWEALTH AVE., NEWTON CENTRE, MASS.

ECONOMY in FRACTIONAL HORSEPOWER



ABART SPEED REDUCERS

Fractional Horse Power
Worm Units

give you speed reduction with freedom from noise, dirt and danger.

AT LOW COST

Horizontal or vertical drive. Let Abart help on your speed reduction problem. Over 75 types and sizes.

Send for Bulletin 800.

ABART GEARS

Accurate. High quality. Made only to your own specifications. Let us estimate.

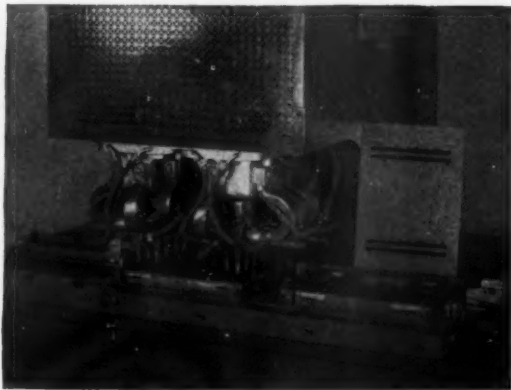


1 1/2 A and SA Unit
1/20 to 1/2 H. P.
rating. Wt. 9 lbs.

Abart **GEAR AND MACHINE CO.**
MANUFACTURERS OF
Speed Reducers & Gears
4832 W. 130th St. CHICAGO, ILLINOIS

Reinforcing Ammunition Boxes

Welding of reinforcements in ammunition box ends has been speeded by this Hydromatic welder which incorporates an unusual fixture shuttling mechanism and was developed by Progressive Welder Co., 3019 E. Outer Drive, Detroit. To the right of the fixture may be seen the assembled part, the job being to weld channels to the flat plate. With the fixture at right, channels and box end are dropped in place and clamped.



The fixture shuttles left below the welding point, where 16 welds are performed automatically. While the assembly is being welded, the left end of fixture is moved to left of welding head and an assembled box end is removed and parts for another clamped in place.

The fixture then shuttles back to right and second finished assembly is removed. Thus, only 2 stations are necessary in the fixture, although there are 2 loading positions and one welding position and no time is lost in loading. Production is at the rate of some 300 assemblies per hour.

Better Magnets

New alloys for permanent magnets are about 30 times better than the best carbon steels used a decade or more ago, William E. Ruder, head of the metallurgical and magnetic section of the G. E. Research Laboratory, told the Institute of Radio Engineers and the Radio Mfrs. Ass'n Engineering Dept., at Rochester (N. Y.) recently.

Until about 1930, said Mr. Ruder, permanent magnets were made of alloy carbon steel. Then alloys free from carbon were devised. Some of the most effective are those known as "alnico."

The latest alnico—an alloy usually consisting of iron, aluminum, nickel,

and cobalt — may contain a small amount of copper as well. With magnetic cooling, its maximum energy is about 5 times greater than that of the best alnico alloys of a few years ago.

EKLIND

UNIVERSAL MILLING HEAD

CAN BE
ADAPTED
TO ANY
MACHINE

MILLS
DRILLS
BORES

at any
angle

Speeds
from
250-4000

Write
for
Circular



UNIVERSAL HIGH SPEED TOOL CO.
551 W. Washington Blvd. Chicago, Ill.

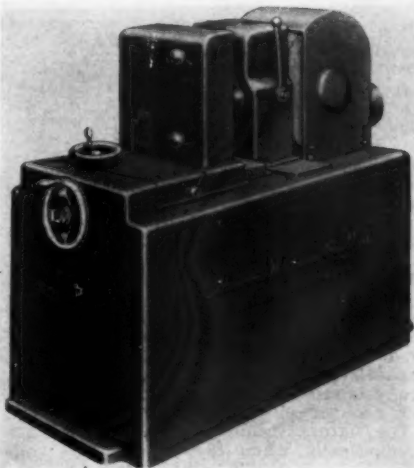
Hammond "OD" Cylindrical Polisher

Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo, Mich., announce development of a new "OD" Cylindrical Polishing Machine capable of handling $\frac{1}{4}$ " to 9" shapes, rods, and tubes; especially adaptable to the use of abrasive belts with back stand attachments, polishing or buffing wheels. The range of feed is said to be 0 to 50' per minute, forward or reverse. The machine is claimed to be designed to permit an inexperienced operator to obtain quality finishes at high production rates.

It is a substantial, sturdy machine, using for polishing members, various types of wheels and abrasive belts. The wheel head mounting is heavy and rugged with a large spindle running in precision ball bearings lubricated with oil and sealed to prevent ingress of dust and dirt. A slide provides quick adjustment of the polishing and/or patented cushion wheel (6" face x 12 to 16" diameter).

The Vari-Matic feed is motor driven through a variable speed drive, allowing various speeds of rotation of work as well as feed. A quick release lever enables operator to control the work being fed through machine by disengaging the work from face of wheel.

Work support is adjustable to wheel by quick simple means for work of varying diameters. The particular style or type of work support is either standard, or specially built for requirements.



All parts are carefully guarded and readily accessible. Wheel cover can be removed quickly for changing wheels and abrasive belt.

Revised Bronze Table

Ampco Metal, Inc., Milwaukee, Wis., has issued a revised "Table of Bronze Specifications to Government Requirements" which lists in parallel, bronze specifications that are largely used by government contractors. This useful table lists all the alloy grade numbers cast by Ampco to these various governmental specifications. Chemical composition of each alloy is given for ready reference.

OPEN THE WAY TO GREATER PROFITS



BY USING



HINGES



BUTTS AND CONTINUOUS LENGTHS — for GUARDS — CABINETS — CASES — BOXES — LUGGAGE

WRITE FOR CIRCULAR

S & S MACHINE WORKS

HARDWARE DIVISION

4520 WEST LAKE STREET

CHICAGO, ILLINOIS

Lathe Book

A new 141 page book "Lathe Job Training Units" has just been published at \$1.35 by American Technical Society, 58th and Drexel Av., Chicago.

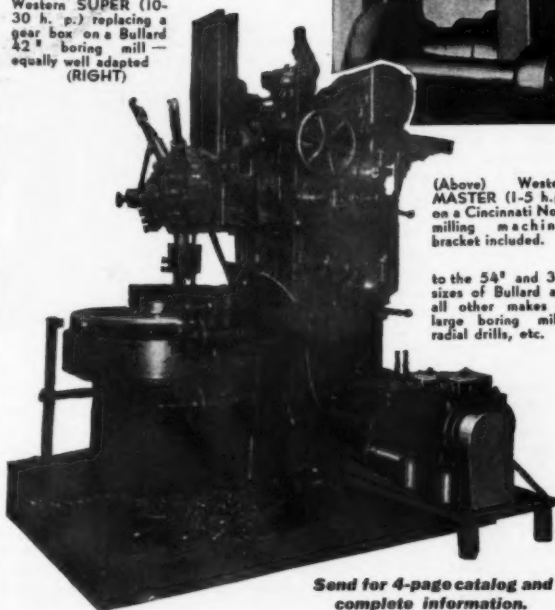
It contains 43 jobs on engine and turret lathes and hand screw machines. They are designed to show the student how to develop skills and acquire knowledge about setting up and operation of the screw cutting engine lathe in centering, cutting off, plain parallel turning between centers, measuring and calipering, facing, shoulder turning, recessing, taper turning and boring, knurling, cutting of external and internal National or U. S. form, square or Acme threads, using steady and follow rests, deep hole drilling, indicating, precision locating, making force and running fits, use of the micrometer dial, taper attachment and change gearing.

Also included is the setting up, tooling and operation of the hand screw machine, turret lathe, and vertical turret lathe.

WESTERN TRANSMISSIONS

A MASTER, capacity (1-5 h. p.), a MAJOR, capacity (5-10 h. p.) and a SUPER (10-30 h. p.) can be installed on lathes, milling machines, shapers, radials, slotters, boring mills, gear cutters, die sinkers, etc.

Western SUPER (10-30 h. p.) replacing a gear box on a Bullard 42" boring mill — equally well adapted (RIGHT)



(Above) Western MASTER (1-5 h.p.) on a Cincinnati No.2 milling machine, bracket included.

to the 54" and 36" sizes of Bullard and all other makes of large boring mills, radial drills, etc.

Send for 4-page catalog and complete information.

WESTERN MANUFACTURING CO.

3408 Scotten Ave.

Detroit, Mich.

Additional hints are given in blueprint reading, lists of reference material, check lists of lathe parts, etc.

The book is written by the staff of Dunwoody Industrial Institute and is number one in a series of machine shop training unit books. Other units are in preparation now.

New Simmons Miller

A new No. 1A Micro-Speed Milling Machine is announced by Simmons Machine Tool Corp., 1725 N. Broadway, Albany, N. Y. It has been designed especially for rapid production of small parts such as those used in airplane, automotive, and other relative forms of manufacturing and should be especially useful on war production.

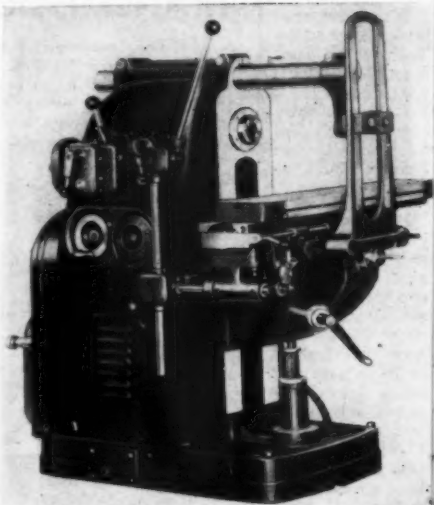
Application of the Micro-Speed drive unit gives a very flexible range of spindle speeds from which the right speed for the job may be selected readily for any class of material or cutting tools. Selection of speeds is made by turning handwheel adjacent to dial on column. All controls are centralized on one side of machine for easy access.

Table is provided with adjustable aligning gibs to compensate for wear. In addition, it is provided with large oil pockets and 3 heavy T slots. Positive automatic longitudinal power feed is supplied to table, and all feeds are provided with adjustable dials graduated to thousandths of an inch.

An attractive 4 page booklet is available giving further details.

Synthetic Resin Spacers

Milling cutter spacers of synthetic resin are introduced to American industry under the trade name Artus spacers, and sold by Industrial Products Suppliers, 2 Broadway, New York



City for general milling machine use.

Non-hygroscopic and impervious to oil, the spacers are made in thicknesses from .001-.020", with standard diameters and keyways.

One of the chief advantages claimed is that each thickness is made of a different color, and thus they do away with the lost time and motion of micrometer-caliper measurements. Made of synthetic resin, the cost is low, and they can be supplied immediately.

REGRIND TO LOWER COSTS

ROTARY POWER CUTTERS

"Ground from the Solid after Hardening"

DESIGNED AND SERVICED BY

SEVERANCE TOOL COMPANY

1510 East Genesee Avenue

SAGINAW, MICHIGAN



REGRIND TO SAVE TIME

Old-Timers

With every possible machine tool urgently needed for the war production effort, many old-time tools, long unused, are being brought back into production.

As many of these old timers have poor tolerances, they are being used for rough work. This is very valuable in that it saves the more exact modern machines for work of close tolerances.

The use being made of some of these old time machines is interesting. One old planer in a shop in Providence, R. I. is a veteran of four wars. In the Civil War it smoothed deck plates for the Monitor, the iron-clad vessel that was a forerunner of today's steel dreadnaughts.

Another war tested veteran is the vertical boring mill in Allentown, Pa. that was built in 1865 and first produced parts for pumps used in the last year of the Civil War. Through the Spanish-American and World War I the mill turned out large metal rings used in the construction of heavy machinery.

In the past few years it has been frequently idle, but now is planing gate castings for a dry dock for the Navy. Since it is operating only 40 hours a week, it wants more work on castings up to 11 feet square.

Douglas

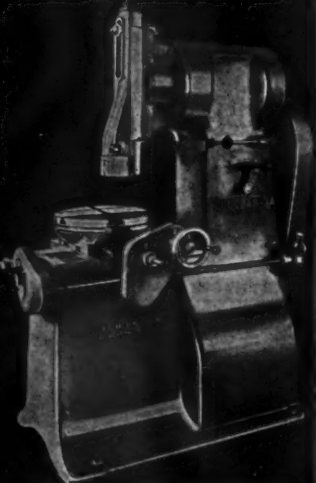
PRECISION SLOTTER

FOR TOOLROOM AND PRODUCTION

Swiveling ram head
and tool holder, auto-
matic circular table
and independent
automatic feeds in all
directions.

Prompt Delivery
by
Large-Scale
Production

Built with
7", 8", 10"
Stroke



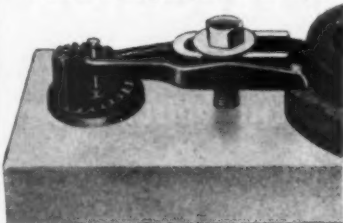
DOUGLAS MACHINERY CO., INC.

150 BROADWAY, NEW YORK, N. Y., Dept. 805

Then there is a planer that was a hit of a display at the 1893 Chicago World's Fair. After years of service, it was replaced by a more modern one. Since the cost of dismantling the machine for junk would have been more than the return from the metal on the scrap market in the depression, it was put in a corner to gather dust. Now, however, the old planer is busy on a Navy contract, despite its age.

REDUCE SET-UP TIME SPEED PRODUCTION

With K-O Adjustable U-Clamps

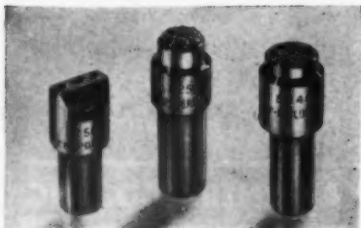


No. 4 U-Clamp with $\frac{1}{4}$ " bolt—\$1.25.
Discounts for quantities.

Turning step-elevation base quickly adjusts clamp to work height. Three-point contact assures uniform pressure, strong grip. Made in six sizes—three styles.

Write today for circular and prices.

K-O PRODUCTS CO.
BENTON HARBOR, MICHIGAN



MEYERS "Dia-Brasive"

MULTIPLE DIAMOND POINT DRESSERS
for Efficient, Economical Service

With "Dia-Brasive" Multiple Point Dressers, numerous sharp points are always exposed to the work, or face of wheel. New points can be secured by turning dresser a quarter or half turn. The small diamonds are more reasonable in price, and remain sharp longer, than large stones. We also make a complete line of single point diamond dressing tools. Special dressers built to order.

Write for new literature.

W. F. MEYERS CO., INC.
Dept. BB, BEDFORD, IND., U.S.A.

Sequence Timer for Resistance Welding

For use in automatic resistance spot, butt, or projection welding, a new weld and sequence timer is announced by Westinghouse.

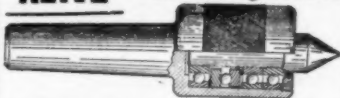
Housed in a steel wall mounted enclosure of black crinkled finish, the unit is 17 $\frac{1}{4}$ " high, 12" wide, and 12" deep. Approximate shipping weight is 60 pounds. On a dead front panel, also of steel, are mounted the individual timing circuit, adjusting potentiometer knobs and dials, repeat and non-repeat switches, and the tubes.

The control transformer is wound for 115/230/460/515 volts, 50/60 cycles. The solenoid relay is rated 25 amperes at 110 or 220 volts and 10 amperes at 440 or 550 volts. Standard foot switch control voltage is 115 volts except when 24-volt circuit operation is specified.

The timing circuit is fully electronic and consists essentially of a resistor capacitor circuit whose charging rate is adjustable by varying a resistor. The voltage of the circuit is applied to the grid of a thyatron tube so that after a predetermining charging time has elapsed the thyatron is energized and operates the relay.

The timer divides the total time of a weld into the various intervals in which the welder goes through its operating sequence and includes a "weld" period of 3 to 30 cycles when the full welding current flows. When welding thick plates, brass, or stainless steel, timing facilities permit intermittent heating and cooling steps of from 3 to 30 cycles.

"ALIVE" Ball Bearing Centers



"They turn with the work"

Write TODAY — and let us
tell you more about them.

MODERN MACHINE CORP.
323 Berry St., Brooklyn, N. Y.

Heat-Treating Airplane Parts

Tubular parts for speedy Lockheed Interceptor planes, now being turned out for use by this country and Great Britain, are produced in record time. Since these vital parts must be both elastic and tough to withstand the stresses, careful heat-treating is essential.

To accomplish this job, Menasco Mfg. Co. has installed 4 G-E cylindrical electric furnaces for hardening and drawing, and a water-cooled oil quench. Two G-E atmosphere gas converters maintain an inert atmosphere in the furnaces, and assume that analysis of gas in furnaces is constant regardless of changes in rate of flow.

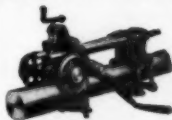
Heretofore, one of the greatest difficulties in hardening and drawing tubular parts has been excessive cooling encountered in transferring parts from furnace to quench tank. This has been overcome by installing two quenching hoods on the furnaces to protect parts as they are transferred.

After charge is brought up to proper temperature in hardening furnace, a high-speed hoist, equipped with a transfer hood, is brought over furnace and the charge quickly pulled into



transfer hood. Hood is then positioned over oil quench tank and charge quickly dropped into oil. This transfer hood is said to minimize cooling, warpage, and scaling of the thin-wall tubular parts during transfer from furnace to oil quench tank.

BURR KEYSEATERS



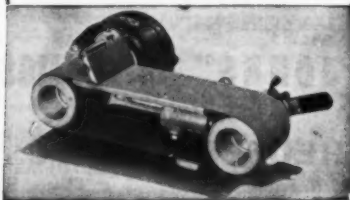
Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

JOHN T. BURR & SON
429 Kent Ave., Brooklyn, N. Y.

AN INEXPENSIVE ABRASIVE BAND GRINDER



"Built Like A Machine Tool"

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on belt. Ball bearing throughout, equipped with Alemite lubrication, complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

WALLS SALES CORP.
96 Warren St., New York, N. Y.

Wallace Metal-Cutting Saw

The No. 1-M Metal-Cutting Saw is shown with a new cast-iron T-slot table assembly to accommodate holding of materials of irregular shapes, or for clamping a vise or fixture in any desirable position.

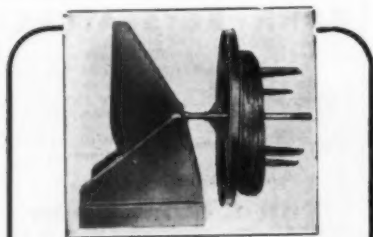
With motor unit and blade or abrasive wheel sliding back and forth on radial arm, this machine handles cut-off work on hard and soft steel, angle iron, brass, bronze, duralumin, aluminum, etc.

The column, arm and motor all rotate 360° and may be locked in any position for simple or compound angles or for ripping work. Stock is held stationary while motor unit is pushed or pulled to make the cut. It has capacity for material up to 4" in depth, and motors up to 2 hp single or 3-phase.

Either saw blades or 3/32" thick abrasive wheels are used for cutting, depending on the type of material to be machined. Bars, sheets, extruded sections, metal mouldings, tubings, casting sprues and many other forms



of material are accommodated by optional table assemblies. The maker is J. D. Wallace & Co., 142 S. California Av., Chicago.



**AVOID INJURY — SPEED PRODUCTION
WITH**

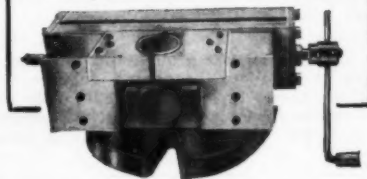
Shiftweight

Husky, welded steel construction with a capacity to handle up to 300 pound wire coils with coil arms adjustable from a minimum inner coil diameter of 10" to extreme diameter of reel. Shiftweight is snarlproof and easily handled by one man. Operates smoothly and will give years of trouble-free service.

Write for folder giving complete details.

MOSLO MACHINERY INC.
4516 SUPERIOR CLEVELAND, OHIO

MACHINING SPECIAL FITTINGS



You do most of your Drilling and Tapping operations better and at less tooling cost with the

"JOHNS" DRILL JIGS

Write for information

HEUSER MFG. CO.

1638 N. Paulina St.,

Chicago, Ill.

Plants for Sub-Contract Work

SUPPLEMENTING the lists recently published in this original and exclusive BLUE BOOK service, here are some additional plants available for sub-contract work.

Address all communications to Defense Sub-Contract Dept., Hitchcock Publishing Co., 508 South Dearborn St., Chicago, Ill. (Phone—HARRISON 6040). There are no charges or obligations. This is a gratuitous service contributed by The BLUE BOOK to help speed our American All-Out Victory Program:

H-19—Indianapolis tool manufacturer has spare capacity on night shift and wants sub-contract work. Equipment includes Monarch, Lodge & Shipley, Springfield, Sidney, Whitcomb-Blaisdell, and Chard lathes 16x48" to 20x60"; Hardinge bench lathe; Kearney and Trecker, LeBlond, Brown & Sharpe and Osterlein milling machines; Sellers and Whitcomb-Blaisdell planers; Whipp and Steptol shapers; Warner & Swasey 3A; Gridley and Foster screw machines; American radial drill; Buffalo Forge, Avey and Auro, drill presses; Universal and Rockford boring mills; Norton external and Heald interior grinders; Diamond surface grinder; Cincinnati tool grinder; Landis plain grinder; Greenard arbor press; Geier straightening press; Marschke B and D grinder; Band, rip and cut-off saws; Dumore grinder Type 30; Cincinnati dividing head; Surface plates; Tapping attachments; Electric hand drills; Straight edges; Jacks; Hoists; Gas furnace and smithing forge; Acetylene welding equipment; Plug gages; Magnetic chucks; Scales; Planer centers, etc.

H-20—Michigan manufacturer of wire garment hangers has factory space and men skilled in wire working available for sub-contract work.

H-4—Cincinnati plant with 60,000 sq. ft. of floor space, could add two night shifts. Has wide range of equipment including:—2 head planer, 18' table, 32" between housings, 30' bed; 10' power press brake, 8 gauge; turret lathe; 16 bench type drill presses, all sizes; 17 various sizes of engine lathes; 10' 8-ga. power shear; 5 disc grinders, double end; 5 milling machines; shaper; radial drill; 5 metal cutting saw tables; 11 floor type drill presses, all sizes; 4 buffing and polishing lathes; 5 endless belt sanders; 4 swing polishing lathes; 4 pipe and bar bending machines; 250 and 450 amp. arc welders; Heavy duty abrasive cut-off machine; tilting band saw; 2 complete acetylene welding outfits; large spray booth; Also woodworking machinery:—2 blade, 16" joiner; 2 blade 24" planer, 15" tilt table rip saw; 36" band saw; 16" disc sander; 24" throat jig saw; 14" swing, 24" bed and 26" swing and 80" bed woodworking lathes. Also complete non-ferrous metal foundry and equipment with 4 gas and oil burning melting furnaces; sand blast outfit; cranes; core ovens, sand sifting riddles, band saw, etc. Can do machining and finishing work to specifications, furnishing pattern work, castings, sheet metal work, stampings, assembling, etc.

H-6—New York manufacturer of fine scales and weighing devices has capacity for drilling, screw machine, tapping, milling, light stamping, spring winding, heat treating, gear hobbing, assembly, paint finishing and baking, spot welding, rough grinding and all types of wood-working sub-contract work. Set-up is such that they can furnish complete units by supplying the castings on which any of the machine work is to be performed. Subsequent to machining, plating and finishing can also be handled. Equipment includes 2 screw machines, 2 gear hobs, 11 lathes, 8 milling machines, 23 drill presses, 2 tapping machines, 9 grinders, 9 heat treating furnaces, 14 power presses, 2-16" shapers, Lindley jig borer, V-16 Doall contour saw, 24"x24"x48" spur-gear planer, 3 Sleeper & Hartley spring coiling and hooking machines, degreaser, slip roll forming machine, spot welder, die filer, 2 power saws, 150 amp. arc welder, cut-off machine, 5' shear, tumbling barrel, spray booths, steam baking ovens and miscellaneous wood-working machines.

H-8—Efficient Indianapolis plant equipped for making dies, jigs, fixtures, stampings or handling production work. Equipment includes 5 lathes (1 turret), 3 milling machines, 3 punch presses, shaper, surface grinder, planer, 3 filing machines, band saw, tool post grinders, drill presses, etc. Good mechanics.

GEARS IN STOCK— Immediate Shipment!

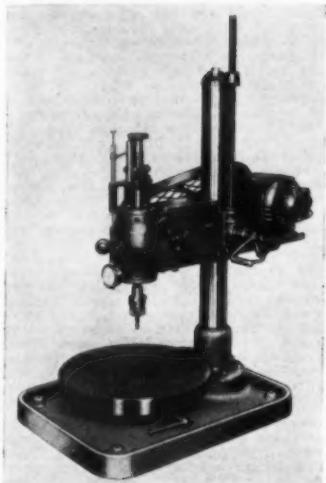
Spur, Bevel, Miter, Worms, and Worm Gears. All pitches and sizes. Attractive discounts.

Send for special stock gear bulletin No. 111.

BRAD FOOTE GEAR WORKS
1305 S. Cicero Ave., Cicero, Ill.

"KEEP 'EM FLYING"
BUY DEFENSE SAVINGS BONDS

PRECISION TAPPING MACHINE NEW—DIFFERENT



Taps guided by precision leads—Leads furnished for any screw pitch, right or left hand threads. Capacity $\frac{3}{4}$ " including $\frac{1}{2}$ " pipe threads—Four speeds from 200-600 RPM. Equipped with dial indicator for bottom tapping. Ball bearings used throughout—Present users have speeded up their production considerably. Quick Delivery.

POSITIVE OFFSET BORING HEAD



Employs no dial—Measurements are taken across two hardened buttons, eliminating all chance of error. Capacity up to 15". O.D. Dia. 4-7/16" over-all length without shank 3-11/16"—Boring bar hole 1". Shank

steel B&S No. 9, 10, 11, 12, Morse No. 4 and 5.

Immediate Delivery—Satisfaction guaranteed.

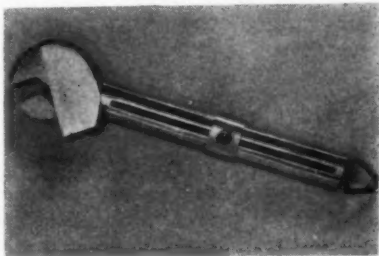
Pacific Tool & Supply Co.

342 No. Vermont Ave.

Los Angeles, California

Speedgrip Wrench

The Pack-Rite Machine Corp., 828 North Broadway, Milwaukee, Wis., announces that organization is now in progress for manufacture of the "Speedgrip-Automatic" Adjustable Nut Wrench.



This ingenious wrench is speedily adjustable to any size nut or bolt by merely flashing the handle-band up or down on the handle shaft. Grip of the jaws is self locking; cannot slip and increases its strength when operated on larger size nuts or bolts according to the makers. Will not bind when released; zips into position in a flash; operated with only one hand; will be manufactured in nut and pipe wrench types in four different sizes.

Nitralloy & Nitriding Process

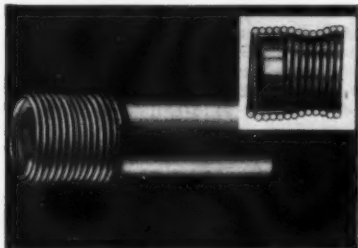
This is the title of a 40 page data book just issued by Nitralloy Corp., 230 Park Ave., New York City, written by Dr. V. O. Homerburg, their technical director.

Included in the book are tables, charts and data covering the composition of Nitriding Steels, preliminary treatment, physical properties, the Nitriding process, properties of Nitrided Nitralloy, a useful bibliography and list of applications.

Protecting Tubing Ends

Designed to protect plain end and beaded tubing from handling knocks and shocks and to seal out dirt, dust and moisture, a new line of inexpensive flexible metal caps, for which patents are pending is announced by Tubing Seal-Cap Inc., 215 W. 7th Street, Los Angeles.

A unique steel spring of hourglass design is incorporated in these new caps which are sold under the trade name Flex-Caps.



When turned in a counter-clockwise direction, the spring expands to accommodate the tubing which it seizes firmly when released. It is said that Flex-Caps cannot be knocked off and will not pull off until turned off when removal is necessary.

Due to the fact that Flex-Caps are

faster to attach and can be re-used many times, the manufacturer claims they are far less costly than rubber and cellulose and that being of steel, cadmium-plated to U. S. Army Specifications, there is no danger of particles chipping off and entering the tubing, or of tubing becoming damaged when dropped or struck. They are available to fit all standard tubing from 3/16" to 2".

Guth Lighting Catalog

The new No. 40 Guth catalog presents a complete line of luminaries for fluorescent and incandescent lamps. It includes industrial and commercial lighting equipment designed and engineered with the benefit of 40 years' experience in these fields.

The "Eye - to - the - Future" feature provides a permanent lighting system with flexible foot candle capacity for increased illumination when desired. Address Edwin F. Guth Co., 2615 Washington, St. Louis, Mo.

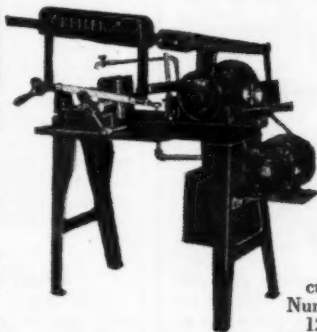
KELLER NO. 2C WET CUT POWER SAW

WRITE FOR CATALOG
NO. 8 ON FULL LINE
OF SAWS AND
MACHINE SHOP
EQUIPMENT

SPECIFICATIONS

Capacity, 6 $\frac{1}{2}$ x6 $\frac{1}{2}$ inches.
Vise swivels to 45 degrees.
With automatic stop, electric switch.
Length of blade 12 inches.
Four speeds available, by shifting belts on V-belt pulleys.
H. P. required, $\frac{1}{4}$; speed of motor, 1750.
Automatic lift on reverse stroke to insure longer life of blades, more ac-

226 LAFAYETTE ST.,



FISHER
TOOL COMPANY

PRICE
COMPLETE
WITH MOTOR
\$134.75

F. O. B. Factory

IMMEDIATE DELIVERY
WITH PRIORITY
CERTIFICATE

curate work.
Number of strokes, 74-84-
120-140 per minute.
Weight complete with
motor, 281 pounds.
Weight complete crated,
325 pounds.

NEW YORK CITY



**ELIMINATE
HAND REAMING
WITH THIS
POWER
REAMER**

Power Reaming at its best. Saves time and money. Improves your work. Speeds up removal of burrs from tubing as well as from bores after keyseating or drilling of set screw holes. The Catskill also saves on finish reaming, countersinking and counterboring, smoothing off and chamfering sharp edges of round bar stock and many other finishing jobs.

WRITE FOR DETAILS

CATSKILL METAL WORKS

CATSKILL,

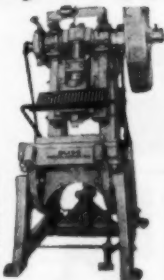
NEW YORK

Junkin Safety Guards

Assure:

- Protection
- Increased Production

Safety is assured by the exclusive JUNKIN TRIPLE INTERLOCK which locks presses until hands are safe. For safety, economy and efficiency equip your presses with Junkin Safety Guards. Recommended for all type inclinable and small presses.

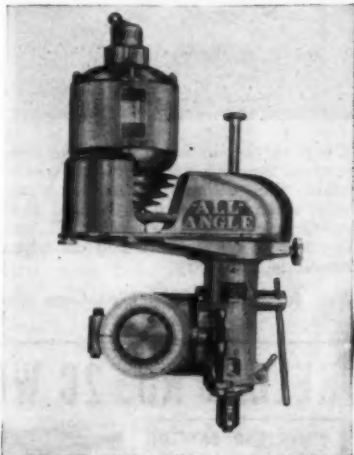


Write for facts and prices

JUNKIN SAFETY APPLIANCE CO., INC.
930 W. HILL ST. LOUISVILLE, KY.

Fray Milling Attachment

A milling attachment designed to speed manufacture of drill bushings is now offered by Fray Machine Tool Co., 501 W. Windsor Rd., Glendale, Cal. The costly operation of raising and lowering milling machine table has been eliminated. By use of a traveling quill, the stepped recess in drill bushings can be milled to close limits, on a production basis, by semi-skilled operators.



Conventional All-Angle features of the milling attachment have been retained, so it can be used for milling, drilling and general shop work at all angles, with one work set-up. The necessary brackets are available for mounting attachment on all makes of conventional milling machines. Complete specifications are shown in Bulletin "B".

Doall Supply Cabinet

Over 8,000 feet of saw in 100 foot coils can be stored according to width, pitch, temper and set in the 12 bins provided in the new DoAll Supply Cabinet. Ample space is also provided for saw bands that are in use.

The Cabinet eliminates the wasteful practice of hanging saw and file bands

from nails, which is not only injurious to saws and file bands, due to lack of proper support, but also makes possible the hazard of being cut by loose and dangling saws. Wrenches and attachments need not be misplaced with the cabinet right behind the machine.

There is room for 12 file bands, and 8 hooks to the left are used for small file bands or file band extensions. The DoAll parts box furnished with each DoAll machine fits into one of three shelves. The remaining shelves are ideal for safe keeping of attachments, which cannot be hung on the door brackets. Eleven brackets for keeping saw guides, file guides, wrenches, filler plates, etc., are located on the doors of the cabinet.



All shelves and partitions are screw fastened, so that adjustments in sizes can be made to suit special requirements. Doors contain a 3-way lock affording protection against theft of supplies, as well as providing added strength in supporting a cabinet in transit. The cabinets measure $16\frac{1}{2}$ " x $30\frac{1}{4}$ " x $79\frac{7}{8}$ " and are made by Continental Machines, Inc., 1300 S. Washington Av., Minneapolis, Minn.



SPEED UP! WITH THE **CATSKILL MODEL W— WET TYPE ABRASIVE CUT-OFF MACHINE**

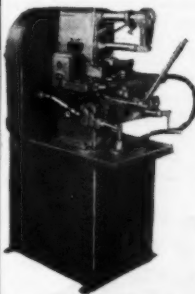
Fast, smooth cuts in solids to 2", tubings and shapes to 3". Will not burn or leave objectionable burr. High alloyed hard steel and many other materials.

Write for detailed information,
Bulletin No. 2.

CATSKILL METAL WORKS
CATSKILL, NEW YORK

HAND AND POWER FEED MILLING MACHINES

V-Belt Drive



Write for additional information and data on these time and money-saving machines.

Designed to meet the requirements of those who need a good rugged production milling machine. Has rack feed for quick operating 3-step V pulley on motor and one on jack-shaft. Reversing switch and motor are mounted in base. 12 speeds are obtainable, from 180 to 3200 RPM. Spindles are made of special spindle steel ground and fitted with Timken adjustable roller bearings.

MILLER & CROWNSHIELD
GREENFIELD MASSACHUSETTS

Steelweld Bending Press

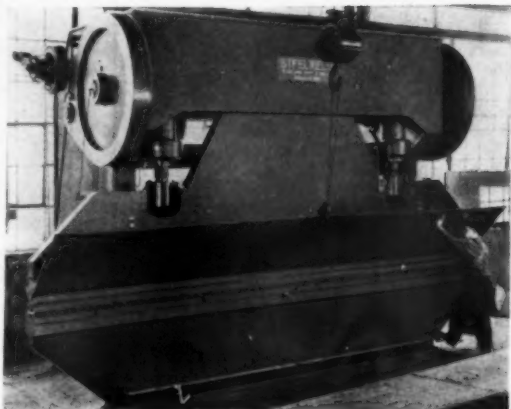
Steelweld Machinery Division of Cleveland Crane & Engineering Co., Wickliffe, Ohio, announce a new Steelweld Bending Press, Model L5½-12 with double bed and ram extension for bending and forming plate up to 20 feet in width.

Various plate thicknesses may be handled depending upon the plate width. The picture shows a 20-foot plate 5/16" being bent. The same machine will bend ½" plate up to 12 feet in width, and even heavier plate that is less in width.

Frame is of the one-piece all-welded steel construction. All gearing is protected in metal enclosing covers. Shafting and machinery are located at rear, thus preventing damage from bent-up plates, crane hooks, etc.

Two solid forged steel eccentrics, one on each end of machine, operate ram. Each eccentric has three extra large main bearings and an eccentric bearing. Bearings are automatically lubricated by two pressure-type oiling units mounted on either end of machine.

Main drive clutch is of heavy multiple-disc type, easily adjusted without tools. Usual brake troubles are said to be eliminated by using a clutch,



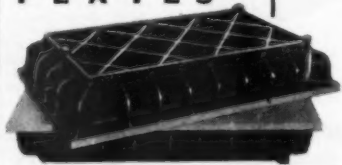
that is, a duplicate of the main clutch, for braking.

Bending, forming, blanking, drawing, and multiple-punching operations may be performed on Steelweld presses. Gauges and indicators provided make it a simple matter to obtain identical results repeatedly with a set of dies.

Cambric Insulators

To do its part in offsetting the rubber shortage, General Electric has developed a varnished cambric cable insulator as an effective rubber substitute. Complete details are given in a new bulletin.

REID MASTER PLATES



A NECESSITY IN EVERY PLANT WHERE ACCURACY IS DESIRED

THOROUGHLY NORMALIZED and WEATHER SEASONED, PLANED and SCRAPED on same 3-POINT BEARING on which they will rest in use. GUARANTEED ACCURACY within .0003" on a 24" x 36" size. AVAILABLE PLANED and SCRAPED in standard sizes 12"x18" to 36"x72". THE ONLY PLATE that has a 50% trade in value when purchasing a new REID plate.

Prompt delivery on priority orders.

Tool Engineering Service Co., Inc.
243 Washington Ave. Nutley, N. J.

Air Hammer Test Bench

Despite the widespread use of air hammers in general industry, particularly within the aircraft field, no means have been available for quick determination of their operating efficiency or to check performance against predetermined standards. The Burklyn Test Stand shows the three basic factors of performance—air consumption, force exerted by hammer, and blows per minute. For all three factors, manufacturers of air hammers have established definite standards for peak performance and with this testing equipment these standards can be maintained.



A unique method of holding air hammer in position for testing and a means of applying correct amount of initial pressure on rivet set is provided with the use of an elastic strap, and a novel gauge setting device. A Hanson "Push-Tite" coupling on front of cabinet is used for connecting air to hammer.

Equipment is made by the Burklyn Corp., 3427 Glendale Blvd., Los Angeles, Cal.

What angle—
What position—
What space—
required for
YOUR CLAMPING?



YOUR ANSWER:

KNU-VISE TOGGLE ACTION CLAMP

After base is fastened permanently in vertical or horizontal position, clamp can be swung to any angle between 90 to 180 degrees, thereby giving versatility in clamping work. Clamps exert unyielding bull-dog grip, which can be instantly released by throw of handle. Same powerful pressure is applied on each successive operation—no delays experienced in making time-consuming adjustments—production carries on without interruption.

KNU-VISE
INCORPORATED

**206 Grove Avenue
Highland Park, Mich.**

No. 4 Reed-Prentice Vertical Milling Machine

A new No. 4 improved Vertical Milling Machine is announced by Reed-Prentice Corp., Worcester, Mass., incorporating many interesting features.

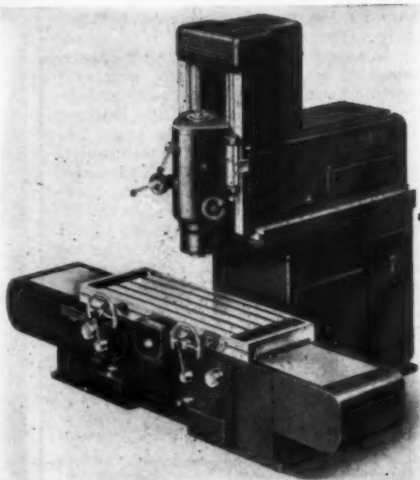
The vertical head carries spindle, mounted on widely spaced precision taper roller bearings at nose, and a double row taper roller bearing on upper end mounted to allow for axial expansion or contraction of spindle. Spindle nose conforms to the N. M. T. B. A. standard No. 50. All gears in head are helical, lubricated from a pump, supplying a cascade of oil to all moving parts. A spindle lock, built into head prevents starting spindle until lock is released.

Motor on top of cross slide provides rapid traverse to head, up or down, and is controlled from push button panel. Hand movement is also provided through hand wheel mounted on head. Machine is designed for power down feed which can be supplied at extra charge.

Turret stop has four positions with adjustable dogs in each position. These dogs trip a limit switch stopping head rapid traverse motor and coming to rest on a positive block. A dial indicator is provided for setting head accurately.

Nine speed changes are provided in gear box and are controlled from one lever on side of cross slide, easily reached from operator's position. Thus, one pre-selector lever used in conjunction with back gear in head controls 18 different spindle speeds. Spindle reverses through motor reversing switch.

Lever to right of operator, connected to a hydraulic motor, controls feed and rapid traverse of table in both directions, upright position of lever being top position. Any feed rate can be had in the range from $\frac{1}{2}$ " to 37" per minute and is preselected on dial below hand lever. By moving lever beyond feed position in either direction,



rapid traverse is engaged. Rapid traverse rate is 180" per minute. The airplane type handwheel is a separate control, connected with same hydraulic motor, to operate table at feed rates up to 10" per minute, regardless of setting of feed selector dial. Rotating this handwheel increases rate of travel and when released it will return to neutral position. Handwheels project above top of table but can be swung forward quickly to clear overhanging work.

10 hp drive motor for spindle is coupled direct to drive gear box through flexible coupling. 5 hp motor for hydraulic pump is connected to pump by silent chain.

Table working surface is 24"x70"; Size overall is 24"x84"; Floor to top of table is 32" and Thickness of table is 7- $\frac{1}{2}$ ".

Longitudinal travel of table is 48"; (60" table travel is available at extra charge); Cross travel of ram is 24"; Vertical travel of head is 12"; Top of table to spindle nose, Maximum is 24"; Minimum is 12"; Throat distance is 33"; Top of table to underside of cross-slide ways is 19- $\frac{3}{4}$ "; Spindle speed range is 30 to 1200 (18 speeds).

Power rapid traverse (With spindle stationary or running), Rate table or cross-slide is 180" per minute.

Floor space required is 137" x 110"; Height is 107"; Net Weight is 18,000 lbs.

Classified Section

USED AND REBUILT MACHINERY

Lists of Used and Rebuilt Machinery, either For Sale, Wanted, or For Exchange, set in uniform style, will be published in the Classified Section at the rate of \$5.00 for your name and address and a five line advertisement. For additional lines, 45c per line.

Write directly to those offering the machine for sale, for prices and full descriptions. If what you seek is not advertised, write Hitchcock Publishing Company, Chicago, making known your wants on either new or used machinery and the publisher will gladly pass them along to the advertisers.

FOR SALE BY

Aaron Machinery Co.,

176 Lafayette St., New York, N. Y.

Automatic screw machines, Cleveland, Model A, 14", 8", 3", 2", 24", 44", 34".
Automatic screw machines, Fay.
Boring mill, Bullard 36" vitl, 3 heads.
Drills, radial, 3" Morris, 34", 4" Mueller, m.d.
Drill, radial, 8" Western, oil groove base, m. d.
Engraving machines, Gorton, all sizes.
Eyeletting machines, United Shoe, Model B.
Gear cutters, 11" Gleason, bevel, (2).
Gear hobbbers, G. & E. & Shuchardt & Schutte.
Gear hobbbers, Barber-Colman, No. 2, 3.
Grinders Brown & Sharpe No. 11.
Grinder, Brown & Sharpe No. 12 cyl.
Grinders, Bryant No. 6 internal.
Grinder, Churchill-Morgan internal.
Grinder, Cincinnati, 8x18" cyl, m.d.
Grinders, No. 55, 60, 65, Head internal.
Grinder, Brown & Sharpe No. 13 univ. tool.
Grinder, Norton, 50x28" roll, m.d.
Grinder, P. & W. 12" vertical, 14" b. b.
Grinder, Walker 10" rotary.
Grinders, Greenfield No. 51 Hydrolit int.
Grinders, Landis, m. d., 12x24", 18x52".
Grinders, Modern, m. d., 12x24", 12x42".
Hammers, Fettinghill trip, No. 1, 2.
Index filing machines, Oliver.
Lathes, 16x8, 18x8, 18x10", quick change.
Lathe, American, 18"x8", taper.
Lathe, American, 30"x26", 5 step cone.
Lathe, Hendey, yoke, 14", 30".
Lathe, Putnam 28"x18".
Lathe, 24x10" Reed-Prentice, grd. head, m.d.
Lathe, 21"x14" Reed-Prentice, geared head.
Lathe, 18-36"x7-10" Fay Scott, sliding bed gap.
Lathe, 54"x30" New Haven.
Lathe, 24"x27" American, 5 step cone.
Millers, Becker vertical, No. 2, 3A.
Millers, B. & S., Cincinnati No. 2, 3.
Millers, Brown & Sharpe No. 12 production.
Presses, power, all sizes and types.
Screw machines, Cleveland 44", 54", model A, auto.
Shapers, crank, 14", 16", 20", 21", 26".
Shaper, American 24" s.p.d., universal table.
Shaper, Steptoe 24", m.d.
Turret lathes, Bardons & Oliver No. 2, (4).
Turret lathes, Gisholt, 28", 21".
Turret lathe, Foster, No. 1B univ., s.p.d.
Turret lathe, Warner & Swaney, No. 2A, univ., s.p.d.
Hydraulic pumps, presses, accumulators.
200 spindles of single and mult. spindle drill presses.

FOR SALE BY

Siegmán Machinery Co.

561 W. Washington Blvd., Chicago, Ill.

Boring mill, Morris horiz., 3" bar.
Grinder, Bryant No. 10A.
Grinder, Head, 65, internal.
Grinder, worm gear, Pratt & Whitney, m.d.
Lathe, Lo Swing 4"x60", grd. head, dble. carriage.
Lathe, 26"x12" Schumacher-Boye, quick change.
Turret lathes, automatic, Potter & John. 5A & 6A.
Please send us your inquiries.

Globe Machinery Co.

602 W. Lake St., . . . Chicago, Ill.

GUN DRILLS.

1 Pratt & Whitney & 5 Bausch, 2 spindle horiz., 14" cap. size 13x9" 8" bed, swing 7".
Boring bar, 3", Beaman & Smith horiz., floor type, gear box, motor drive.
Broach, LaPointe-Hudson, No. 3, m. d., cut keyways to 14", bro. sq. holes to 34" across flats, 54" stroke.
Grinders, 10"x24" & 10"x36" Norton cyl., m. d.
Lathe, Johnson, 21"x14", gd. hd., 2 steady rests, face plate, arr. m.d.
Lathe, Fitchburg 34"x60" low swing, gd. nd., 2 carr.
Lathe, 20"x10" Whitcomb-B., gd. hd., m. d., complete.
Lathe, Harrington 48" gap, 15" between centers when bed is open.
Pipe threading machine, cap. 2" to 8" arr. m. d., including 8 dies, cutting-off-attach. & oil pump.
Planer, 36"x36"x16", 6" bed, Gray, 2 hds. on rail.
Radial drill, 34" Mueller, t. a., oil grooved base, gear box, with table.

Production Machinery Sales Co.

52 Vanderbilt Ave., New York, N.Y.

Moulder, American No. 34, 15" four side.
Planer & matcher, profilers, Berlin No. 91, 13x6".
Planer, single, L. Power 24x14, endless bed.
Planer, double, Whitney No. 24, 44", round heads.
Rip saw, circular, Greenlee No. 408, 36".
Sander, Berlin 22", roll feed, 3 drum.
Sander, new Yates-American S-14, hand block belt.
Saw, bench, Yates-American No. 1, motorized.
Surfacer, dpl., Berlin No. 177, 30x12".
Surfacer, Whitney 30", double.
Tenoner, American No. 20, motorized, single end.

USED AND REBUILT MACHINERY

FOR SALE BY

Matson Machinery Sales

513 Brumder Bldg., Milwaukee, Wis.

Boring mchcs., Auto Machine Co., vert. h.f., m.d., (2)
Broach, La Pointe, with assort. of broaches.
Broach, oil gear, horiz., h.f.
Die casting mach., Kipp caster No. 118.
Drilling mch., Columbus 8 st. vert. auto. turret, m.d.
Lathe, Amer. q.c.g. 30"x27", cone pulley.
Punch, Williams & White No. 32 multiple, 12' ram.

The Elyria Belting & Machinery Co.

Elyria Ohio

Reamer, quickwork, 48".
Cut-off machine, Bardons-Oliver, all-g geared, hollow
spdl. 3-3/8".
Gear shaper, No. 61 Fellows.
Nipple machine, Langelier, semi-automatic, 5-station.
Nut tappers, 1/2" National.
Press, No. 74 Hiles d. g., s. a. 12" stroke, 30" between
 housings, 300 tons pressure, single crank.

Davis Machinery Company

1-3-5 St. Clair St. Toledo, Ohio

Gear cutter, 48"x12" Gould & Eberhardt, s.p.d.
Gear cutter, No. 3-36" Brown & Sharpe, s.p.d.
Grinder, No. 6 Besly, dbl. spdl., disc.
Grinder, 16x42" Landis plain, b.d.
Grinders, No. 6 & 10 A Bryant chucking, b.d.
Keyseater, No. 2 Mitto & Merrill, b.d.
Lathe, 30"x16" Bradford, semi-q.c.g.
Lathe, 32"x38" Gleason, st. c. gear.
Lathe, 14"x8" LeBlond, c. g., taper attach., m.d.
Lathe, 42"x16" Bradford, triple geared.
Lathe, 16"x8" Hendey, c. g., motor drive.
Nibbler, No. 103 Gray, cap. 1/8" throat, 30".
Planer, 36"x36"x8" American one head.
Press, No. 90-D Toledo, dbl. crank, m.d.
Press, No. 54 Toledo, s. a., grd.
Press, No. 91-C Toledo, dbl. crank, grd.
Press, 8 ton general flexible, for m.d.
Punch, Long & Allstater multiple.
Screw machine, 8" Gridley, 4 spindle model F auto.
Screw machine, 12" model B Cleveland automatic.
Screw machine, 16"x8" & 18"x14" Clevelc., Model A auto.
Screw machine, No. 83 National Acme, 4 spdl., auto.
Shaper, 16" Newark, b.g. crank, s.p.d.

Russell Machine Co.

438 Oliver Bldg. Pittsburgh, Pa.

Bulldozer, No. 4 Wms. & White, m.d.
Die filer, No. 3 Thiel, m.d.
Gear planer, 36" Gleason, b.d.
Gear planer, 54" Gleason, m.d.
Grinder, univ. No. 5 B&S, 20x72", b.d.
Hammer, 60 lb., Little Giant, b.d.
Lathe, 42"x17'6" Pond, p.c.g., triple grd., b.d.
Press, hyd. 1000 ton wood platen, 42"x9".
Press, o.b.i. No. 5 Toledo flywheel.
Press, o.b.i. No. 3 Toledo flywheel.
Punch, multiple, style "E" L&A 195" th. cap. 340 tons.
Punch, beam, Cleveland, cap. 24".
Shaper, draw cut, 48" Morton, m.d.
Shear, Alligator, No. 61 Carlin knife, 24" sq.
Shear, plate, 9"x1" Mesta, 36" throat, b.d.
Shear, squaring, Wheeling 16"x3", m.d.
Slotter, 18" Bem. Miles, table 36" dia., b.d.
Upsetting machines, 24", 36", 48" and 54" Ajax iron bed.

FOR SALE BY

Acme Equipment Company

Allison Park, Pennsylvania

Furnace, gas, No. 3 American.
Lathe, 15"x6" bed, Carrol James, q.c.
Lathe, 60"x22" bed, New Haven, p.c.
Planer, 17"x48" Whitcomb.
Turret lathe, 18" Libbey.

Mayer A. Rubenstein

5 Lehns Court, Easton, Pa.

Lathe, LeBlond 24"x12", q.c., double back grd., taper
attachment, power feed to hexagon turret.
Lathe, LeBlond 24"x16", q.c., double back geared, V-
ways, 3 step cone drive.
Press, Bliss No. 14 toggle.

S. M. Regar Machinery and Semi Supplies

Tampa, - - - Florida

Boring mill, Bickford, hor. spdl., g. b., tbl. type size 4".
Boring mill, Niles 36" 2 swivel heads.
Broaching machine, LaPointe No. 3-B, b.d.
Drill presses, upright, from 14" - 36" sliding and
stationary heads, back geared and power feeds.
Grinder, Bridgeport, face, 24" wheel, 11" bed.
Lathes, Gisholt 24" production.
Lathe, LeBlond 19"x8 loose change gear.
Lathes, National 18" production, (3)
Lathe, Bullard 22"x8", turret head.
Lathe, Jones and Lamson 2x24", flat turret, cast head.
Lathe, Pittsburgh 36"x18", solid spindle, c. g. r.,
raising blocks, 48".
Shaper, Putnam 36", friction feed.
Slotter, 15" Bement Miles, No. 487 power cir. table.

The Nutmeg State Machinery Corp.

1041-1051 State St., New Haven, Conn.

Drill press, Henry & W., 6 spl., class B, 12" overhang.
Drill press, Leland Gifford, 3 spdl., p.f. to each spdl.
Drill press, Leland Gifford, 4 spdl., p.f. to each spdl.
Drill, radial, Amer. 24", (3), one with oil gr. base, s.p.d.
Drill, radial, Mueller, 24" pl., with oil gr. base, s.p.d.
Grinder, Landis No. 2 universal.
Grinder, Landis, 12"x66" universal.
Grinder, Norton 10"x24", plain.
Grinders, Bryant No. 30, m.d. internal chucking, (3).
Millers, Brown & S., No. 13B production (2) 1 tap, nose.
Thread miller, Lees Bradner No. 3C, with 9 collets, 6"
hole in spindle.
Thread miller, Pratt & Whitney, 6"x48".
Turret lathe, Warner & Swasey No. 5A.

E. L. Klauber Machinery Co.

3221 Olive St. - - St. Louis, Mo.

Band saw, Racine 2 speed motor drive.
Centering machines, revolving head type.
Grinders, cutter & tool.
Hammer, Bradley strap, 30 lb.
Lathes, precision bench, Ames, Stark, Elgin.
Polishing machines, No. 11 Hanson-VanWinkle, m.d.
Press, No. 60 N Bliss O.B.I., double action.
Radial, 34" Canedy Otto, wall type.
Radial, 24" Carleton, sensitive, belt.
Riveting machine, No. 4-A high spdl., rot. vibr. type.
Spot welder, 12 kva Gibb.

USED AND REBUILT MACHINERY

FOR SALE BY

Lang Machinery Company

28th St. & A. V. R. R.

Pittsburgh, Pa.

Air compressor, 10"x10" Ing.-Rand. 245 c.f.m., m.d.
Air compressor, N-503 Chicago, 492 d.f., oil dr.
Bolt cutter, staybolt 1 1/2" Acme, leadscrew, m.d.
Bulldozers, No. 2 & No. 4 Wms. & White, m.d.
Centering machine, P&W, 4" 2 spdl., b.d.
Crane, 5 ton O.E.T., 45' 6" span, m.d.
Column facer, 60" dia. Espen Lucas, b.d.
Cut-off machine, 3" Hurlburt Rogers, b.d.
Die filer, No. 3 Thiel, m.d.
Draw bench, Aetna-Standard, 25,000 lb., 36' long, m.d.
Drill, mult. No. 3 Rockford 2 spdl., s.p.d.
Drill, mult. 10 spindle D-12 Fox, b.d.
Drill, radial 7" Mueller, t.a., m.d.
Drills, upright, 11" to 34" b.d. & m.d.
Gear cutter, spur, 30"x16", B. & E., m.d.
Gear cutter, spur 36"x9" G. & E., m.d.
Gear cutter, spur 30"x12" G. & E., s.p.d.
Gear miller, No. 1 Bilton, cap. 4", b.d.
Gear planer, 36" Gleason, bevel, m.d.
Gear planer, 54" Gleason, bevel, m.d.
Generator, 100 KW Westinghouse d.c., 125 v. b.d.
Generator, 150 KW Jeffrey, d.c. 250 v. b.d.
Grinder, cyl. No. 14 Brown & Sharpe, m.d.
Grinder, cyl. Wells 6"x14", m.d.
Grinder, dbl. end, Standard Elec. 7 1/2" H. P. 230 v. d.c.
Grinder, dbl. end, 24" Marchke, m.d.
Grinder, d. e. 12" Marchke, m.d.
Grinder, disc No. 6 Gardner, 10 H.P., m.d.
Grinder, drill, No. 5 Oliver, m.d.
Grinder, gear tooth, Detroit No. D-12, m.d.
Grinder, internal cylinder, No. 8 Landis, b.d.
Grinder, tool & cutter, No. 1 Cin. univ. b.d.
Grinder, tool & cutter, Ingersoll inserted tooth, m.d.
Grinder, univ., No. 5 B. & S., 20"x72", b.d.
Grinder, worm-hob, Plaster "FS", b.d.
Grinder, No. 40 Heald, b.d.
Hammer, 50 lb. Little Giant, s.p.d.
Hammer, power 300 lb. Bradley compact, m.d.
Hammers, steam drop, 400-lb. to 8000-lbs.
Hammers, steam forging, 600 lbs.—6000 lbs.
Keyseater, No. 2 Baker, b.d.
Keyseater, No. 3 Baker, 34", m.d.
Lathe, 8 1/2"x41" Young, m.d.
Lathe, 10"x45" Seneca Falls, m.d.
Lathe, 18"x4" LeBlond, q.c.g., d.b.g., b.d.
Lathe, 18"x8" Emmes, p.c.g., t. b.g., b.d.
Lathe, 18"x8" Prentice turning, d. b.g., p.c.g., b.d.
Lathe, 20"x8" Whitcomb-Blaissell, q.c.g., b.d.
Lathe, 20"x12" Reed-Pren. grd. head, q.c.g., m.d.
Lathe, 21"x8" LeBlond hvy. duty, d. b.g., b.d.
Lathe, 27"x11" LeBlond, grd. hd., q.c.g., d.b.g., m.d.
Lathe, 27"x12" Putnam, hvy. duty, q.c.g., d.b.g., b.d.
Lathe, 30"x27" American geared head, m.d.
Lathe, 36"x14" Putnam hvy. duty, d.b.g., b.d.
Lathe, 36"x26" New Haven, p.c.g., b.d.
Lathe, 42"x20" Springfield trip, grd., p.c.g., b.d.
Lathe, 42"x17" Pond, triple grd., p.c.g., b.d.
Lathe, 48"x22 1/2" Johnson, trip, gd. int. face pl. dr. b.d.
Lathe, 48"x26 1/2" Johnson, trip, gd. int. face pl. dr. b.d.
Lathe, wheel 78" Bement-Miles, m.d.
Lathe, gun boring, 2 bar. cap. hole 12"x40" m.d.
Lathe, turret 24"x26" P. & W. grd. head, s.p.d.
Lathe, turret 26" Libby "C", h.s. 8", m.d.
Lathe, turret 3"x36" J&L, bar & chuck, s.p.d.

Miller, plain No. 6 Brown & Sharpe, m.d.
Miller, vert. No. 2 Becker, tbl. 30"x58", m.d.
Miller, thread, Smalley General, cap. 12"x36", m.d.
Nipple threaders, 4"-14" & 2" Landis, b.d.
Picking machine, Mesta, 8-12" arms.
Pipe machines, 8" Williams, 2 1/2" to 8" motor drive.
Pipe machines, 3"-4"-12" & 18" Weiland, b.d.
Pipe machine, No. 88 Jarecki, 2 1/2"-8", m.d.
Planer, 36"x36"x10" American, 2 heads, m.d.
Press, double acting, No. 1 Bliss, roller feed.
Press, and wheel Stiles-Parker, stroke 14".
Press, end wheel No. 2 Bliss, roll feed, m.d.
Press, 250 ton Baldwin-Southwark 4-post.
Press, foot, No. 2 Swaine, bed opening 6"x74".
Press, forging, 1500 ton Farrell-Birmingham, m.d.
Press, hydr. Woods 1000 ton, platen 42"x9".
Press, o. b. l. No. 68-C Bliss, stroke 5".
Press, o. b. l. No. 3 Toledo, stroke 14".
Press, o. b. l. No. 5 Toledo, stroke 24".
Press, perforating, No. 51 V&O, str. 4" dbl. crk.
Press, straightening, Hunt hydraulic, 50 tons.
Press, straightening, 30 ton Manley, lever action.
Press, trimming No. 50 Bliss, stroke 5".
Press, hydraulic shell bending, No. 4, 12-cyl.
Pump, centrifugal Worth. C.L.C., 6" suction, 5" dis.
Pump, Worthington 9"x2"x12", 22 gpm, 3000 lb. steam.
Punch, lever, No. 88 Niagara, 36" throat.
Punch, mult. 10" L & A, cap. 340 tons pressure.
Punch, mult. No. 6 H. & J. 8", 1400 tons, m.d.
Punch & shear, No. 3 L & A, rap. act. 4"x4".
Punch & shear, Cleveland "G", 2" thru 1", m.d.
Punch, 3-A Royersford, 10" throat, 1 1/4"-4", m.d.
Punch, double end L & A, throat 36".
Punch, No. 3 H & J, throat 36".
Punch, No. 6 L & A, 16 1/2" thrt. 3 1/4".
Rolls, forming, 30" Pexto, cap. 14 gauge.
Saw, cold No. 14 Higley, cap. 7" round.
Saw, cold & rot. planer, No. 216 New, 26" saw, m.d.
Saw, cold, Espen Lucas, blade 22", cap. 6" rd.
Shaper, draw-cut 48" Morton, m.d.
Shaper, traveling head, 50", Bement, m.d.
Shaper, 20" Hamilton high duty, m.d.
Shaper, 24" G&E heavy duty, m.d.
Shear, allig. Pittsburgh, cap. 2"-24", m.d.
Shear, allig. No. 7 United, 8" square, m.d.
Shear, alligator No. 4 D&K all steel, cap. 6", b.d.
Shear, alligator, cap. 18", blade 10".
Shear, circle, No. 65 Niagara, b.d.
Shear, plate, 72"x18" United, m.d.
Shear, plate, 132"x8" Wheeling, gap. 15", m.d.
Shear, plate, 10"x8" Pittsburgh, gap. 15 1/2", m.d.
Shear, plate, 9"x12" Mesta, throat 36", b.d.
Shear, squaring 10"x16" Ohl, b.d.
Shear, sq. 34"x31/2" Hvy. Park, thrt. 9 1/2".
Shear, sq., 36"x4" United, b.d.
Slotter, b. Betts, m.d.
Slotter, 15" Dill, m.d.
Upsetter, 4" Ajax, steel bed, m.d.
Upsetter, 6" Ajax, steel bed, m.d.
Vertical attachments, Nos. 1, 3, 4 and 5 millers.
Straight'ner, shape, No. 3 Sutton, 2-way, cap. 2 1/2", m.d.
Tapping machine, duplex Garvin 2-X, 1 1/2"-3", b.d.
Welders, 150 amps, and 200 amps, portable.
Welder, 200 amp, Lincoln, 4-cyl. gas engine.
Wire straightener, 8" Schuster, 4" cut-off, b.d.

The Reeve-Fritts Company

28 N. Clinton St.,

Chicago

Drill head, U.S., 4 spdl., 1 1/2" cap.
Grinder, Lumsden face, 12" cap.
Grinder, Covel auto, saw, cap. 16" to 24".
Pipe mach., 2 spdl. Murchey, 2" cap.
Saw, shop, 6"x8" Marvel, h.s.

Oliver Motorcraft Corp.

2532-34 So. Wabash Ave., Chicago, Ill.

MICRO INTERNAL CYLINDER GRINDER
Belt driven, overhead countershaft, long spindle,
grinds wet or dry, universal fixture for clamping
work. In very good condition.

Priced reasonably at \$800.00

USED AND REBUILT MACHINERY

FOR SALE BY

B. D. Brooks Co., Inc.

361 Atlantic Ave. Boston, Mass.

Sheet metal working machinery, hand and power.
All types of new and reconditioned equipment.
Apron brakes, press brakes, shears, folders.
Bending rolls, corrugating rolls, forming rolls.
Punches, bead rollers, rotary machines, stakes, etc.

Reliance Machinery Sales Company

1407 Brighton Place, N. S. Pittsburgh, Pa.

Air compressors, 139 and 450 cu. ft.
Brake, press, 6' x 16 ga. Robinson, toggle.
Buildozer, No. 4 Williams-White.
Grinder, No. 14 Besley double disc, 26" discs.
Hammers, riveting, 3/16", 1/4" and 3/8".
Hammers, 50 lb. Mayer, 40 lb. Bradley helve.
Lathe, 27" x 15' Prentice, taper, arr. m. d.
Miller, model C Becker vertical, m. d.
Miller, 30" x 10' Newton slab, m. d.
Planer, 24" x 24" x 8' Powell, 1 head, rev. m. d. 220 v., d. c.
Press, No. 82-C Toledo dbl. crank, 44" wide, 5" shaft, 2" stroke, m. d.
Pump, Goulds centrifugal, 3 stage, 250 g.p.m. against 34' head, m. d., 3-60-220 v.
Pump, hydraulic, 15 G.P.M., 1800 lb. m. d.
Punch, 48" throat Beatty, 1" thru 1" m. d.
Swaging machine, No. 5 Etna, cap. 3" tubes.

What do you need? What have you for sale?

Wm. C. Johnson & Sons Machy. Co.

1211 Hadley St., St. Louis Mo.

Air compressors, 15 in stock.
Bolt threaders, 1", 1 1/2" & 2" Acme.
Drill, Natco 13 spindle, No. 1 taper.
Drill, No. 2 Fox, 6 spindles.
Drill, radial 42" Bickford.
Drills, radial, Drillmaster, new.
Drills, Sipp, m. d. single spindles, (2).
Forging machine, Ajax 2".
Gear cutters, No. 1 Whitons. (2).
Hammers, 300 lb. Beaudry, 75 lb. Bradley, 50 & 100 lb.
Little Giant.
Hobber, Adam No. 1, like new.
Lathes, 16x24, Logans, m. d., new in stock, (10).
Lathe, 17" x 16' Sidney, q. c. g.
Lathe, 28" x 18' Greaves & Klusman, q. c. g., t. a.
Lathe, 30" x 18' Pittsburgh, q. c. g., t. a.
Lathe, 22" x 48" x 16' Putnam q. c. sliding bed, gap.
Lathe, 26" x 14" Hamilton, q. c. g.
Lathes, 82" Niles locomotive wheel.
Miller, Burr, 22" table.
Miller, No. 3 Knight vertical.
Millers, 2, Lincoln type.
Pipe machines, 2"-4"-6"-8"-12".
Planer, 30" x 30" x 6' Pond, 1 head.
Planer, 36" x 36" x 5' Gray, 2 heads.
Planer, 32" x 33" x 15' Gray, 2 heads.
Planer, 60" x 60" x 10', Sellers.
Press, 55 Swaine.
Press, 69 N Bliss, double acting.
Press, wheel, 200 ton 48" Niles.
Press, Excelsior d. crank bed 62x28-1 1/2" stroke.
Press, Excelsior, hydraulic 300 ton vert.
Punches, shears, bulldozers.
Roll, plate straightening, H. & J. No. 2, like new.
Shaper, G. & E., 26" heavy duty.
Shapers, 12"-16"-20"-24".
Welders, spot, new-3 in stock.
Large stock guaranteed electric motors. Any size.

FOR SALE BY

M. P. Gooley

123 Avery Ave., Syracuse, N. Y.

Bending rolls, No. 1 Hilles & Jones, pyramid type lower rolls 52", upper 56", m. d.
Boring mill, 30" Gisholt, vert., turret head on rail, cone dr., grd. feeds, power rapid traverse, chuck.
Lathe, engine, 20" x 16' Reed, s. c. g., cone with Cullman dr., motor controls, face plates, chuck, steady rest.
Milling machine, No. 2 Cincinnati, cone dr. vertical hi-power, 16 speed countershaft, 16 feeds, capacity 28" x 12" x 17", table 12" x 32", 154" overhang.
Milling machine, No. 3 Cincinnati, pl., cone dr. with Turner drive, motor, controls, all power feeds, cap. 34" x 12" x 19", table 12" x 52".
Punch, model EF Cleveland, 26" throat.

Alex Zeeve & Company

2269 Woolworth Bldg., New York, N. Y.

Bolt threaders, 4" Landis, 2" Acme "Class A", 14" National.
Cylinder boring mill, horiz., 7" bar, swings 96" over bed.
Drills, radial, 3" Mueller, gear-box, s. p. d., (2).
Gear hobber, 24" Rhenania, universal.
Hammers, forging, No. 3-B Nazel and No. 3-N Nazel.
Hammers, pr. 500 (2) & 400 lb. Beaudry "Champion".
Hammer, steam, 250 lb. Niles-Bement-Pond, agle, fr.
Keyseaters, No. 3 Mitte-Merrill, No. 2, 1, & 0 Baker.
Lathes, engine-38" x 20" Kahn-Mayer-Carpenter semi-q. c.; 28" x 16' Walcott, q. c. g., taper; 24" x 16' Whitcomb-Blaisdell, q. c. g., taper; 18" x 16' Lodge & S., 12 sp. rel. g. h., s. p. d., tap. 14" x 16' Bradf. gh. q. c. g., m. d.
Miller, No. 6 Whitney, hand, a. c., m. d.
Planers, 36" x 36" x 14' Woodward-Powell, 1 rail head, 1 side hd.
36" x 36" x 8' Powell, hvy. dy., rev. m. d. with motor, 1 rail head.
Punch & shear, comb., No. 54 Beloit, b. d.
Shears, squaring, 30" x 18' Stoll, a. c., m. d. Shears throatless, 4" Ryerson, b. d.; 10-gauge Marshalltown, a. c., m. d. Shears misc. 8" x 14" Lennox rot. splitting, a. c., m. d.; 60" Yoder rot., 14 ga. capacity.
Slotter, crank, 24" Betts heavy duty.
Tapper, No. 8 Gatterman pneu. oscillating, 8" x 14" cap.

ALSO MANY OTHER TOOLS.

North Machine Tool Corporation

179 Lafayette St., New York, N. Y.

Worth 4-5690

Automatic, Acme 6" four spindle.
Gear gen. 18" Gleason straight bevel.
Gear hobber, No. 60 Plauter.
Grinder, No. 12 Brown & Sharpe plain cylindrical.
Grinder, 8" Head rotary surface, 2 motors.
Grinder, 12" Pratt & Whitney vert. surf. w. motor.
Lathe, 17" x 22" Pratt & Whitney, bench.
Lathe, 16" x 16' Bradford geared head, motor drive.
Lathe, 18" x 18' Sidney quick change gears.
Lathe, 26" x 18' American quick change gears.
Lathe, 20" x 18' LeBlond quick change gears.
Lathe, 22" x 16' Whitcomb-Blaisdell quick change gear.
Miller, No. 2-A Becker vertical, motor drive.
Miller, No. 2 Brown & Sharpe universal.
Saw, metal, No. 6 Cochrane-Bly.
Saw sharp, machine, No. 11 Cochrane-Bly.
Shaper, 30" Ohio.
Turret lathe, No. 4 Bardons & Oliver.
Turret lathe, 22" Gisholt, spindle hole 3/4" pwr. fd.
Turret lathe, 24" Gisholt, spindle hole, 2 1/2" pwr. fd.
Turret lathe, 34" Gisholt, spindle hole 6 1/2" pwr. fd.

USED AND REBUILT MACHINERY

FOR SALE BY

West Penn Machinery Company

1210 House Building,

Pittsburgh, Pa.

Air compressors, 30 to 2500 cubic feet.
Baling press, paper, Log emann, b.d.
Blower, No. 4 Roots, capacity 3110 c. f. m.
Bolt cutters, 19", 21", 23", 25" Acme, b.d.
Boring mill, 6" Niles, knee type, b.d.
Blue print machine, 60" a. c., 110 volt.
Bulldozers, Nos. 2, 4, 6, 9, 28, & 30.
Crusher, jaw, No. 4 Champion, b.d.
Die filer, No. 3 Thiel, m.d.
Drill sharpener, Aug.-Rand "Leyner", 18".
Drill, radial, 5" American, semi-univ., b.d.
Drills, upright 10" to 26".
Drill, No. 319 Baker, No. 5 M.T., m.d.
Engine, gas, 30 horse power Bessemer.
Gear tester, bevel 16" Gleason.
Gear hobber No. 1 Adams, 12", b.d.
Generator, plating 6-v, 3500 amps.
Grinder, "Kwick-Way" all purpose, m.d.
Grinder, knife 16" Bridgeport, m.d.
Grinder, roll, Farrell 30" x 26".
Grinder, surface vertical, 30" table, 16" wheel, m.d.
Grinder, tool & cutter, No. 2 full automatic, m.d.
Grinder, No. 2 tool & cutter, Greenfield, b.d.
Hammer, drop board, 500 lb. B. & S.
Hammer, drop board 800 lb. B. & S.
Hammers, 50 lb., 75 lb., 100 lb., 200 lb. Upright.
Hammers, 100 lb. Bradley cushioned helve.
Hammers, Nos. 2-B, 3-B, 4-B, 6-B, Nasel.
Hammers, steam, forging & drop.
Keyseater, No. 1 Baker 14" x 12", b.d.
Keyseater, No. 2 Baker, 2" x 20", b.d.
Lathes, speed, 11" and 13" Blount, m.d.
Lathe, brass 18x6", friction head, power feed, b.d.
Lathe, 7" x 32" P & W, precision, m.d.
Lathe, 19" x 8" Bullard, b.d.
Lathe, 18" x 8" Rockford, b.d.
Lathe, 15" x 12" Hendey, geared head, t. a.
Lathe, 24" x 10" Prentice, b.d.
Lathe, 30" x 20" S. - B. geared head, t. a.
Lathe, 42" x 20" New Haven, geared head, m.d.
Lathe, roll, 54" x 20" std., m.d.

Lathe, turret, 1" Drees-Mueller, b. d.
Lathe, turret, 1 1/2" W & S., bar feed, b.d.
Lathe, turret, 64" Gisholt, t. a. b. & S.
Lathes, turret, Nos. 1, 2 and 3 W. & S., b. d.
Locomotive, gas, 6 ton Milwaukee, 36".
Miller, shaper, duplex, No. 14 Cochrane-Bly, m.d.
Miller, vertical, Burke, table, 16x6, b. d.
Nibbler, No. 1 Campbell 13/16", 6" gap, m. d.
Nibbler, L. & A., 8", 36" throat, m.d.
Pipe, 2", 3", 4", 6", 8", 10", 12", 16", 18" Landis-Oster-Williams.
Planer, 39" x 36" 12" Cincinnati, 2 hds., b.d.
Press, forging, 150 ton United, steam hyd.
Presses, boring, Nos. 38 & 38 1/2 Bliss, b. d.
Press, s. s., No. 7 Am. Can, 3" stroke.
Press, arch, No. 30 Bliss, b.d.
Press, strip feed, No. 31-C McDonald, b.d.
Press, No. 594 Toledo, 12" stroke.
Press, No. 19 Bliss o. b. i., b.d.
Presses, Stiles, type, 1 1/2 and 3 1/2" m. d.
Press, knuckle joint, 1000 ton Toledo.
Press, knuckle joint, 75 ton Toledo.
Punch & shear, "E" Cleveland 1 1/2", b.d.
Punch, horiz. 1" - 1" Cleveland, m.d.
Punch, No. 20 Excelsior, 20" cap. 5/16" - 4".
Punch, multiple No. 8 H & J 96".
Pump, 1500 lb. Triplex vert. 13 gal., m. d.
Riveters, air, hammer, spinning.
Saw, metal band, Laidlaw, m.d.
Shapers, 16", 20", 24" & 36" Gould & Eberhardt.
Shears, alligator, 14", 24", 36", 4" & 6".
Shear, Angle 6x6 1/2 Long & Allstatter, m. d.
Shear, guill., No. 2 H. & J., 24" rd. b. d.
Shear, guill., 4" x 1" Newbold, b.d.
Shear, up-cut, 22" Aetna, m. d.
Shears, 42" - 48" - 54" x 3" United, m. d.
Straightener, McKay 17 roll, 4" dia., m.d.
Straightener, 54" - 6 rolls, 64" dia.
Testing machine, 400,000 lb. Riehle, b. d.
Tumbling barrel, 34" x 48", belt drive.
Upsetters, 1" to 6".
Woodworker, universal Parker, m. d.

Jones Machine Tool Company

Joseph Hyman & Sons,

Front & Pike Sts., Cincinnati, Ohio

Tioga and Almond Sts., Philadelphia, Pa.

BORING MILLS AND MILLERS

WORLD'S LARGEST STOCK POWER PRESSES

60" Poole, 2 swivel hds., No. 3 B. & Sharp, plain.

No. 152 D Cleveland, double crank, 76", crank 4".
No. 204 A Toledo, double crank, gap.
No. 4 United Eng. & Fdry., 4 crank, 156" between uprights, 8" dia crank 7 1/2" stroke, weight 118000 lbs.
No. 6 B Niagara, dbl. crank 36", crank 3 1/2".
No. S 126 Ferracute, dbl. crank 124", crank 7 1/2" - 9".
Nos. 92 B, 91 B & 91 C Toledo, double crank.
No. SG83 Ferracute, 46", 100 tons cap.
No. S183 Ferracute, 52", 9" crank.
No. 894 Toledo, the rod.
No. 2115 Hamilton, tie rod, 500 tons cap.
Nos. 749, Bliss straight side.
No. 407-54 Bliss, toggle, double crank, t. r.
Nos. 14, 34 C Bliss toggle presses.
No. 164 Toledo toggle.
75 ton EG 51 & E 51 Ferracute, knuckle joint.
600 ton American Can, knuckle joint.
No. 1 Toledo, o. b. i., (3).
Nos. 2 & 5 Standard auto. drops.
No. 9C Badger State combination punch & shear.
No. 6 Hilles & Jones multiple punch, ram 100".
Presses, Waterbury-Farrel 16 plunger with cartridge clip dies, weight each approx 18,000 lbs.. (2).
Punches & shears, single & double end.
Squaring shears, various sizes.
These are hundreds of others of popular makes and sizes, are in stock at our warehouse here.
Rebuilt and Guaranteed.

LATHES

16" x 8" Am. q. c. cone dr.
18" x 8" Le B. q. c. cone dr.
18" x 8" Nat. q. c. gd. hd.
18" x 8" Boye E. q. c. c. d.
18" x 12" Boye & Em., q. c.

20" x 8" Am. 3 st. q. c., d. b. g.
18" x 12" Spring, c., s. b. g.
24" x 8" S. & B., l. c. s. b. g.
24" x 10 Niles, l. c.
30" x 10 Niles, l. c.

SHAPERS AND PLANERS

24" Smith & Mills, c. d.
24" Cin. b. g., cone dr.
24" American, cone dr.
34" Niles traveling hds.

24" Steptoe H G shaper.
36" x 10" Bickett, 3 heads.
30" x 30" x 10" Amer., 1 hd.
24x5" Pond planer.

PRESSES

No. 76 Tol. s. a. b. g.
No. 21 Bliss, O. B. inc.
Wickes, eagle, end punch.
No. 4 Rockford, b. gd.
No. 15 Tol. deep throat
No. 92 D Tol. dbl. crank.
No. 160 Cons. dbl. crank,
29x11" bed.

No. 44 Niagara dp. thrt.
Robinson s. a. press, 16"
bet. housings.
No. 7 Waterbury Farrell
plain press.
No. 68 N & 69 N double
action presses.

MISCELLANEOUS

No. 24 Van Nor grinder
m. drive.
48" B. & S. gear cutters.
No. 2 M. & M. Keyseat.
2" Amer. radial, s. p. d.
Gisholt tool grinder.

6x6 Peerless hack saw.
16" P. & W. turret plain.
20 k. w. spot weld.
150 t. Fireston ehyl. pr.
2" Acme bolt cutter.

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FOR SALE BY

Standard Machinery Co.,
347 Indiana Ave. Grand Rapids, Mich.

Cut-off, abrasive, Tannewitz type M-2.
 Drill 75" Superior, sliding head.
 Drill, 40" New Haven No. 5, sliding head.
 Grinder, cylinder, Heald No. 65.
 Hammers, rivet, Grand No. 2 and No. 3.
 Keyseater, No. 0 Mitts & Merrill.
 Lag screw pointer, Pawtucket.
 Lathes, mfg., 12" x 6" Pratt & Whitney, (2).
 Roll former, Kane & Roach, 2 sets spindles.
 Tapper, Anderson No. 40 Dial Feed Auto.
 Welder, Expert Portable spot, 50 KVA.

D. E. Dony Machinery Co.

47 Laurelton Rd., Rochester, N. Y.

Gas cutting machine, 1—No. 7 Oxygraph.
 Press, 1—50-ton Dunning & Boschert, hydr.
 Valves, 50—Littell air blast, complete, for punch press work.

Ogden R. Adams

266 State St., Rochester, N. Y.

Main 6374-5

Die sinking machine, Cooper Bros. vertical.
 Grinder, No. 2 Gardner 18" motor driven, disc.
 Shaper, 20" Hendey, friction geared.

C. R. Daniels

1514 W. Capitol Drive, Milwaukee, Wis.

Arbor press, No. 5 Greenerd, 12 ton, rebuilt, \$150.
 Bending rolls, 8" Kling pyramid, 4" cap.
 Boring mill, 50" Niles vertical, 2 heads on rail.
 Drill grinder, Type A Yankee, b.d., 2" cap.
 Motor drive, Master, for Kempsmith milling mach.

Factory & Mill Supply Co., Inc.

176 Federal St., Boston, Mass.

Boring mill, Binsse horizontal, 4" spindle bar.
 Grinder, No. 55 Heald cylinder or internal.
 Knife grinder, Seybold, 66".
 Planer, 48"x48"x12' Betts, 3 heads, m.d.

Failor-Strafer Machinery Co.

880 Bergen Ave., Jersey City, New Jersey

Blue print drying machine, 42" Paragon.
 Drills, Canedy Otto 34", sensitive radial.
 Flanging machine, No. 4 McCabe.
 Grinder, Norton plain cylindrical, 10"x38".
 Keyseater No. 1 Davis.
 Lathe, 24" Davis, heavy duty turret.
 Lathe, 32"x12" Putnam.
 Lathes, 24"x32", N. B. P.
 Lathes, 24"x10", Lodge & Shipley, turret on shears.
 Miller, No. 2 Shields, high power, single pulley.
 Miller, 48" Newton continuous.
 Press, No. 744 Bias, geared, straight side.
 Press, No. 1 Bias toggle.
 Screw machine, No. 124 S. G. Garvin.

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Automatic screw, turret lathes, Bias presses, shaper, milling and other machinery. Write for complete descriptive list of 41 used machines for sale.

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Bulldozer, Williams & White No. 4, double end.
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Standard Tool & Machine Works

1313 W. Bearsley Ave., Elkhart, Ind.

1 Stewart industrial furnace, size 57, type, oven, serial No. 6688, fuel, gas, opening 22" wide, 10" high, 36" deep, A-1 condition.

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18-10-12-1000 gal. per minute. Steam driven.

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Drill, Garvin, 1S, Duplex, 1 1/4" Cap. B.D.	\$700.
Boring Mill, 8' Niles, Variable Speed AC, Motor Drive	\$17250.
Grinder, Brown & Sharpe, No. 12, 8x36, belt drive	.....	\$2000.
Grinder, Heald No. 65, cylinder with small spindle for internal grinding, motor driven, serial 586	.....	\$1500.
Lathe, Willard 13x6, SQC with chuck, belt drive	.....	\$425.
Lathe, Hendey 19x8, QC with taper attachment	.....	\$1800.
Lathe, Lodge & Shipley, 22x14, patent head, QC, DC motor drive	.....	\$1500.
Lathe, Hamilton, 20"x8", Q.C., Extra Heavy, Taper, Collets and Chuck	.....	\$2500.
Miller, No. 2 Becker, Vertical Power Feed, Rotary Table	.....	\$1000.
Miller, 48" Oesterlein, Rotary Tilted, M.D.	.....	\$4000.
Honing Machine, Hutto, 8' radial arm, motor drive	.....	\$2000.
Planer, Gray 28x28x8, 1 Head, arr. for M. D.	.....	\$1350.
Press, Hydraulic, Hannifin, 20 ton arbor, C frame, motor drive complete	\$450.
Scraper, Anderson, Power, M.D.	\$600.
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Used—Diesel Engine, direct connected to 250-300 KW Generator, 240 volt, DC. Engine and Generator to be fairly late type equipment—not over 10 or 12 years old, in good operating condition. Advise with price and specifications.

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SHAPER, 24" Rockford, m. d.

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\$42.50
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14" U. S. \$35.00

20" Sibley & Ware B.G., P.F.

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25" Bickford, sl. hd. BG & PF.

27" New Haven, B.G. Sl. hd.

GRINDERS:

Angle Plate, Clark & Cincinnati

Disc, No. 6-20 Besty Dbl. Spld.

Disc, No. 220 Badger & press

Drill, New Yankee, D.E.

Elec., Hisey-Wolf 3-6 BOA BB

Elec. wheel, 12" wheel

Flex. shaft, RA 5 Haskins

Emery, DE, Norton 24"

Emery, DE St. Louis 18" & 20"

Internal, Madison:

Surface, No. 1 La Salle.

Tool Post, U.S. Style HA \$47.50

Wet tool, Springfield, 27" wheel

LATHES:

26"x14" Niles, PCG

20"x8" Bradford, PCG MD.

18"x8" Rahn & Mayer PCG

14"x6" Rumsey, PCG

10"x42" Atlas, bench type, No.

H-42, 1/3 HP, 110 V motor

LATHES—Turret:

2x24" Jones & Lamson

12" Reed-Prentice BG

PRESSES:

Arbor, Famco and Atlas.

Arch, Bliss 30-A Grd., M.D.

Cam Drawing, 69-N Bliss

Foot, Famco and No. 4 Swaine

No. 2 L & J, O.B.I. New (2)

Punch, No. 5 Bliss Stiles Grd.

No. 20 Excelsior 1" in 1"

PUNCHES & SHEARS:

SE, Cleveland C 1 in 1", 26" thr.

SE W-W 14 1/2, 25" thr. 1 in 1"

Rock River L, 24" thr. 1 in 1"

DE 1-10 Badger 1 in 1", 10" thr.

SAWS:

Cold, Higley, 20" saw, No. 17

Cold, Higley, 18" saw, No. 14

Hack, No. 3 Robertson 6x6"

Hack, No. 14 Atkins 6x6"

Wells No. 5 & 8, Band, Metal

SHAPERS:

26" Hendy planer type dr.

SHEARS:

Dbl. action, No. 11 Excelsior, in-

side cutting, cap. 12 ga.

Rotary Bevel, Lennox 3"

Slitting, Rotary Niag., cap. 1"

Throat 16"

Square, 36"x18 ga. Pexto Foot,

New (3)

Square, 30"x18 ga. Ditto

No. 254 Pexto 30" Gang Split-

ting 20 ga.

No. 1236 Libert, 12 ga. 36"

throat M.D. (New)

Throatless, 18 H Marshalltown

THREADERS, Pipe & Bolt:

Pipe, 2" Oster No. 302

Pipe, 4" 2-A Williams

MISCELLANEOUS:

Chucks, Lathe 4-jaw Ind. 8" to

16"

Compressor, Herron-Bury CCB,

14x9x8", 6" tank, 20 HP mtr.

Etchtool Metal Marker, Luma

Hammer, 50-lb. Little Giant.

Jacks, Lever Lift, 15 ton Joyce-

Gridland; Simplex; 10-ton

Barrett

Lathes, 30" spinning

Miller, Becker 7H, Lincoln type

Planer, 30"x30"x8" Wheeler

Roll, Corrugating, 10" Robinson

Tappers, St. Louis & Garvin

Welders 2 1/2, 5, 7 1/2, 10 K W

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Valve Refacer, 1/2" Black & Decker

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GOLDMAN & CO.

TOOLS TO FINISH THE JOB...

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21" Cinc. Bick. Box Col.
Prod., m.d. & m., pwr.
feed to spdl., two Buhr
adjustable heads
Fox Multi. Spdle. with
tapping attach. (3)
Kingsbury 4 spdl. with
auto. index. device
21" Rockford Drill (2)
21" Minster Drill
Natic Rotary Drill
Barnes Drill
Moline Hole Hog Drill
4" Carlton Radial, M.D.

GEAR EQUIPMENT

No. 36ST Gould & Eberhardt Gear Gasher
No. 5A Lees Bradner
Hobbers (3)
Williams & White, 96"
diameter x 52" face
No. 3 B & S Gear Cutter
(2)

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AND USED
MACHINERY

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SATISFACTION
GUARANTEED



GRINDERS

10"x18" Norton Grdr.,
pwr. fd., m.d. & m.
10"x24" Norton Grdr.,
pwr. fd., m.d. & m.
No. 2 Diamond Auto.
Surface Grinder

No. 15A Bryant Int. and
Face
Nos. 55 & 60 Heald Int.
No. 1 Osterholm Face
No. 126 Gardner dble.
spdle. hyd. feed
No. 20 Bryant Int.
16"x36" Cinc. Plain Cyl.
LATHES

Porter Cable Lathe
16"x8" Lodge & Shipley
patent head

LATHES—TURRET AND PRODUCTION

34"x11" Wickes Crank-
shaft. (2)
18" Acme, 1½" cap.
3"x36" J & L bar eqpt.
1" Pratt & Whitney Hand
Screw

MILLS

No. 3 Craftsman Ro-
tary Production
54" Ingersoll Rotary,
3 head, motor dr.
66" Newton Rotary
motor drive

Binssee 3½" horis. bor.
Trundle Thread Mill

PRESSES

No. 407A Bliss dble.
crk. toggle, m.d. &
motor
No. 410A Bliss dble.
crk. toggle, m.d. &
motor
No. 8C Rockford dou-
ble crank

SHAPERS

20" Gould & Eberhardt
20" American, S.P.D.

JUST PURCHASED

Large Pels Armor
Plate Shear, for
cutting angles,
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channels

UPSETTER

1½" Acme Steel Bed

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150 KW Federal, mtr. dr.
Taylor Win. 4-way flash

MISCELLANEOUS

Balancer, 18" Gisholt
Static (2)
2—Gisholt Dynamic Bal-
ancers
Broach, 8-ton American
Vert. Hyd. motor drive
Bulldozers, No. 5 Wil-
liams & White
Core Blowers, No. 6
Demmler (3)
Furnace, Gen. Elec., 15
KW, 110 volt
Rivet Heaters, Berwick
(4)
Slitter, 42" Yoder
Threader, Rickert & Sha-
fer, auto. index.
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Hi-lift
Wire Straighteners,
3/16" Shuster to 20"
long
X-Ray Mach., Gen. Elec.
250,000 volt, cap. 2½"
solid steel

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EMCO REBUILD

ENGINE LATHES

11"x5' South Bend, cone
 13"x6' Willard, cone
 15"x6' Willard, cone
 16"x6' Bradford, cone
 16"x6' Carroll-Jamieson, cone
 16"x6' Pratt & Whitney, cone
 16"x8' Greaves-Klusman, cone
 16"x10' Bradford, cone
 18"x6' Bradford, cone
 18"x8' Bradford, cone
 18"x8' Lodge & Shipley, cone
 18"x10' Bradford, cone
 18"x8' Mueller, cone, taper
 18"x10' Reed, cone
 18"x10' Springfield, cone
 18"x12' Barker, cone
 20"x10' Lodge & Shipley, cone
 20"x10' Pond, cone
 21"x12' Bradford, cone
 22"x12' Greaves-Klusman, cone
 22"x16' centers (22" bed) American 100 H.

P. Super Lathe, with d.c. elec. equipment, weight 66,000 lbs.

22"x18' Niles, cone
 22"x13' Niles, cone
 24"x8"x6" Bridgeford, m.d.
 24"x10' Bridgeford, cone
 24"x10' Canada, cone
 24"x10' LeBlond, cone, turret on bed
 24"x10' Whitcomb-Blaisdell, cone
 24"x11' Chard, cone
 24"x16' Schumacher-Boye, cone
 26"x16' Bridgeford, cone, taper
 26"x18' Bridgeford, cone, taper
 30"x14' Hamilton, cone
 30"x16' Schumacher-Boye, cone

MILLING MACHINES

No. 25 Bilton Plain, cone
 No. 2 Pratt & Whitney Hand, cone
 18" Cincinnati Plain Automatic
 18" Cincinnati Automatic Duplex
 C17 Newton Vertical Slab
 36"x14' Bement Slab, m.d.
 No. 2 Garvin Lincoln Type, cone
 40" Ohio Tilted Rotary, m.d.
 C66A Newton 3 spindle Continuous, s.p.d.
 Gooley & Edlund Briggs Type A

BOLT THREADING MACHINES

9/16" 2 spindle Landis, m.d.
 1" 2 spindle Acme, cone
 1"—3 spindle Acme, cone
 1" Landis, cone
 1 1/2"—2 spindle Landis, m.d.
 2 1/2" Acme, cone
 No. 11-S Rickert-Shafer Auto. Threading, m.d.
 1 1/4" American Bolt Heading Machine

BROACHING MACHINES

Cincinnati Mill Broach, m.d., new
 No. 2 LaPointe of Hudson, belt
 No. 2 J. N. LaPointe, m.d.

No. 3 J. N. LaPointe, double, belt
 No. 3B J. N. LaPointe, m.d.

RADIAL DRILLS

2 1/2' Avey Sensitive
 3' American Sensitive
 3' Carlton Sensitive
 4' Hammond Jack Knife
 4' Hammond Jack Knife Wall Type
 4' Prentice Plain, cone
 5' Prentice Plain, cone
 5' Niles Semi-Universal, cone
 4' Gang Plain, cone
 4' Mueller Plain, cone
 5' Fosdick Plain, cone
 No. 1 W. F. & John Barnes Horizontal, c

BALL BEARING DRILLS

Demco H.S., m.d.
 Henry & Wright Class K
 Leland & Gifford, belt
 2 spindle Henry & Wright Class B
 2 spindle Leland & Gifford
 3 spindle Cincinnati Pulley Mch.
 3 spindle Demco, power feed
 3 spindle Henry & Wright Class K
 4 spindle Allen
 4 spindle No. 2 Fosdick, power feed
 4 spindle Gardam
 4 spindle Henry & Wright Class B
 4 spindle Henry & Wright Class K
 4 spindle Kokomo

MULTIPLE SPINDLE DRILLS

4 spindle No. 2 Colburn Mfg.
 4 spindle No. 2 Foote-Burt
 6 spindle No. 4 Foote-Burt
 5 spindle 24" Barnes All Geared Self-
 6 spindle National Acme Auto. Horiz.
 No. 00S, ISS Garvin Horizontal Duplex
 No. 1 Pratt & Whitney 2 spdl. Gun B.
 No. 2, 3 Bausch Multiple, m.d.
 No. 7D Moline 2 spindle Hole Hog C

der Borer
 No. 15HC Fox Multiple, m.d.
 No. 26C Fox Multiple Tapper
 No. 37 Natico, 18 spindles
 No. 51C Harrington, 10 spindles
 No. 220 Baker 2 spindle

HEAVY DUTY DRILLS

D8 Colburn, m.d.
 No. 2, 22 Colburn Mfg.
 Rockford Horizontal
 20" 22", 26" W. F. & John Barnes
 22" 24" Barnes All Geared Self-Oiling
 21" 22", 24", 32", 36" Aurora
 21" 25" Weigel
 32", 36" Cincinnati Bickford

PLAIN CYLINDRICAL GRINDERS

6x32" Norton, m.d.
 10x18" No. 14 Brown & Sharpe, belt
 10x24" Landis, m.d.
 10x30" Queen City, m.d.
 10x36" Landis Integral Cam, m.d.
 10x36" Norton, m.d. (5)

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1001 TENNESSEE AVENUE,

MACHINE TOOLS

0x50" Norton, m.d.
0x52" Landis, m.d.
0x72" Norton, m.d.
2x36" Cincinnati, belt
2x36" Modern, m.d.
2x42" Landis, m.d.
2x48" Modern, m.d.
2x72" Cincinnati, 3 m.d.
4x50" Norton, m.d.
6x52" Landis, m.d.
8x72" Cincinnati Auto Parts, m.d.

UNIVERSAL CYLINDRICAL GRINDERS

2x42" Landis
No. 3, 4 Brown & Sharpe
CYLINDER GRINDERS
No. 50 Heald hydraulic feed
No. 55, 60, 65 Heald

CENTERLESS GRINDER INTERNAL GRINDER

No. 10 Bryant, belt
SURFACE GRINDERS
No. 1 Frazer Lapper, belt
8x48" Diamond L.D. Face
0x84" Diamond H.D. Face, m.d.
4" Bridgeport Knife, belt
No. 500 UK Covell-Hanchett Travel Wheel

TOOL AND CUTTER GRINDERS

No. 3 Brown & Sharpe, belt
No. 3, 4, S, 31 Oliver Motor Driven Drill
Pointers
No. 23 Brown & Sharpe Gear Cutter Grdr.
Gisholt Universal Tool, belt
Gleason Cutter Grinder, belt
Fould & Eberhardt Gear Cutter, belt
Landis Chaser, belt
Modern Chaser, belt
Linkee Drill, belt

HAMMERS

Wetters Bumping, belt
0 lb. Bradley Rubber Cushioned Helve,
belt
0 lb. Bradley Rubber Cushioned Helve,
belt
50 lb. Little Giant, belt
00 lb. Bradley Upright Strap, belt
50 lb. Niles-Bement-Pond Steam (new)
50 lb. Bement-Miles Steam
50 lb. American Eng. Wks. Steam
00 lb. Niles Steam
400 lb. Niles Steam (7 in stock)
000 lb. Erie Double Frame Steam
00 lb. Niles-Bement-Pond Single Frame
Steam
500 lb. Niles-Bement-Pond Single Frame
Steam

PRESSES

Donald Single Crank, 4" stroke
Waterbury-Farrel S.C., wt. 600 lbs.
Waterbury-Farrel D.C., weight 1700 lbs.
2 Ferracute Single Action Drawing, wt.
2100 lbs.

DD2 Ferracute Double Action Drawing wt.
2200 lbs.

P2 Ferracute Stiles Type, 1" stroke
No. 6 Waterbury-Farrel D.C., wt. 4100 lbs.
S51 Ferracute D.C., wt. 7100 lbs.
DG53 Ferracute Redrawing, 10" stroke
No. 2681/4B Toledo D.C. Toggle Drawing,
wt. 175,000 lbs., 15" stroke of blank-
holder, 84 1/2" between uprights
No. 496D Toledo D.C. Toggle Drawing, wt.
160,000 lbs., 8" between housings, 17"
stroke of plunger

Metalwood Hydro Pneumatic No. B45
300 ton Caldwell Wheel Press
Metalwood Hydro Pneumatic No. B33
30 ton Laurie Hydraulic, type BX

PUNCHES AND SHEARS

Cleveland Model EF S.E., 24" throat
No. 6 Long & Allstatter S.E., 9" throat
No. 6 Long & Allstatter D.E., 24" throat
No. 2 Niagara Bench Type

SLOTTERS

84" Newton, m.d.

PLANERS

24"x24"x5' Gray, 1 head
24"x24"x7' Gray, 1 head
24"x24"x12' Chandler, 2 heads
30"x30"x8' Cincinnati, 1 head
32"x32"x12' Gray, 2 heads
36"x36"x10' Whitcomb-Blaisdell, 2 heads

ARBOR PRESSES

No. 24 Greenerd, m.d.
15 ton Lucas High Pattern

AUTOMATICS

3/4-1/2" Cleveland, m.d., model B
4 spindle 3/4" Cleveland Model M, m.d.
3/4" Model A Cleveland
1 1/4-1 1/2" Cleveland Model B
1 1/4" Hartford
2 1/2" Cleveland Model A, m.d.
6" Cleveland Model A, m.d.
No. 5A, 6D Potter & Johnston Automatics
No. 23, 24 New Britain Automatics

TURRET LATHES AND SCREW MACHINES

No. 4 Bardons & Oliver, cone, chucking
No. 4 Foster, chucking
2 1/4" Acme Flat Turret, bar feed
2 1/4"x24" Jones & Lamson Geared Head, bar
(3 in stock)
2 spindle 3x36" Jones & Lamson, chucking,
geared head (4)
3x36" Jones & Lamson Geared Head, bar
3x36" Jones & Lamson Geared Head,
chucking (4)
3 1/4"x40" Greenlee Flat Turret, bar equip.
No. 1 Warner & Swasey, bar, cone
18" Warner & Swasey, cone
18" Acme, chucking
21" Gisholt Model H, chucking (2)
24" Gisholt Model I, chucking (2)
GEAR CUTTERS AND HOBBS
6", 18" Gleason Straight Bevel Gear Gen.

SEND US YOUR INQUIRIES.

MACHINERY CO.,

CINCINNATI, OHIO



**IN
STOCK**

**No. 4 Warner & Swasey
Turret Lathe with
power feed to turret.**

**AUTOMATIC
and HAND**

SCREW MACHINES

**We are continually adding to our stock.
Send us your inquiry!**

**WARNER & SWASEY
BROWN & SHARPE
BARDONS & OLIVER
FOSTER
DAVENPORT
STEINLE**

**MILLHOLLAND
ACME
CLEVELAND
PRATT & WHITNEY
GRIDLEY**

**LAKE MACHINERY
COMPANY**

**632 W. LAKE ST.
CHICAGO, ILL.**

DRILLS

Boley, 10 Spdl. Mult. Drills
1 & 2 Sp. Demco, H.S. B.B.
2 Spdl. Avey H.S. B.B. No. 2
4 Spdl. Henry Wright
1 Sp. Allen, P.F. & T.A.
No. 1 Lel. Gif. Bench, T. A.
4' Western Mfg. Type, Plain
Radial, M.D.
3' Cinc. Bick. Radial, S.P.D.

LATHES

24" Steinle, 61" Hole thru sp.
24"x16" S.B. Std. C.G., T.A.
24"x10" L. & S. Q.C.G., B.G.
14"x10" Hendey Q.C.G., T.A.

GRINDERS

7½ HP U. S. Snagging
Bristol Rotary Surf., 11½" Dia.

Mag. Ck.

No. 23 Baxter D. Whit. Int.
No. 3 B&S Univ. Grinder
MILLING MACHINES
No. 6 Whitney Hand, M.D.
No. 3A B&S Grd. Hd. Univ.
Sd. Ply. M.D.
No. 2 LeBlond Univ. B.G.
No. 2 P & W Hand
6"x48" Pratt & Whit. Thread
18" Cinn. Plain Mfg. M.D.

SHAPERS

25" S&M R.G. Cr., MD. gr. b.
24" G&E Back Geared Crank
20" Steptoe h.g. crank
16" G&E Back Geared Crank

MISCELLANEOUS

Auto. Screw Machine, No. 53

Acme, 1" Cap. M.D. 4 Spdl.

Broach, No. V-18 American
Die Filer, No. 5 Thiel, m.d.
Gear Cut., No. 3—26"—B&S
Press, No. 50-436, Minster,
S. S. 56 Ton
Cap. 4" Stroke, Flywheel Type
Tie Rod
Press, No. 1 Bliss Cam. Fly
Riv. Hmrs. Nos. 1½B, 3A
H.D., 4A Mtr. Dr. & 5A
High Speed
Scleroscopes, Mod. "D" Shore
Saw, 6x6 Peerless Hack
Tester, Brinell Hardness
Welder, 20 KW Ace Spot

George M. Bernstein & Co.

12 SO. CLINTON STREET

CHICAGO, ILLINOIS



**For those "hard to find" machines
and tools you are welcome to use our
"Buyer's Service" without obligation.**



Just another BLUE BOOK service

AUTOMATICS

1/2"-3" Cleveland Model A
1 1/2" Cleveland Model B
2 1/2"-3 1/2" Cleveland Model A
No. 34 New Britain Chuck
No. 6A Potter & Johnstons (2)

DRILLS

Coulter Vert. High Speed Diamond Boring

DRILLS, Radial

4' Dreeses Plain
6 spin. Henry & Wright Sensl.
5 spin. Henry & Wright Sensl.
4 spin. Allen, Sensitive
1 spindle Sensitive
No. 11 Natcho, 8 spin.
20" Sibley Upright
No. 13 P. & W. Multi
No. 18 Natcho Multi
No. 1 1/2 Avey 7 1/2", B.B.
Baker Type M. Tapping
Bausch No. 30 Multi spin. 30"
round head 8 spin.

GRINDERS

No. 51 Oliver, 3" Twist Drill, M.D.
10"x6"x36" Norton Ops., Surf., M.D., 10"x40" chuck
10"x24" Norton Cam, M.D.
No. 2 Churchill Internal, can grind 30" deep, dist. of center of spindle to top of table 18", M.D.
12"x36" Diamond Surface No. 2 with 12"x33" magnetic chuck
18" Besly No. 26 Disc
20"x8" Hamilton, Grd. Hd.
20"x96" Landis Cyl. M. D.
24"x 96" Landis Cyl. M. D.
30" x 240" Landis Roll M. D.
90" Bridgeport Shear Knife
3 HP Black, Decker emery M.D., 3/25/220
24" Blount Snagging
Wilmarth & Marmon Twist Drill, M.D.

LATHES

18"x8' Whitcomb B., Grd. Hd.
18"x8' Hamilton, Grd. Hd.
24"x12' Amer. Q.C.G., T.A.
20"x8' L. & S., Grd. Hd., M.D.
20"x12' L. & S., Grd. Hd., M.D.
21"x8' Ryerson Grd. Hd.
22"x24"x12" L. & S., Q.C.G., M.D.
24"x10' L. & S., Grd. Hd., M.D.
24"x12' Putnam Grd. Hd., M.D.
24"x20' Lodge & Shipley QCG.
26"x11' Wickes Heavy Cone
28"x16' Pond, L. C. G.
30"x12' Pittsburgh, QCG., M.D.
30"x16' N.B.P. Axle & Journal, Center Drive, M.D.
32"x16' Schumacher Boye
36"x25' Pond, 2 carr., Tri. Grd.
36"x27' Gleason, F. Plate Dr.
88"x36' Fifield, Tri. Grd.
90" N.B.P. Heavy, Wheel
Peerless Banding Lathe, M.D.

MILLERS

36" Bias Vert. or Die Sinker
Nos. 2 & 3 P. & W. Die Sinker
No. 2 Cincinnati Cone M.D.
No. 3 Newt. Miller, 30"x30"x6"
28" Cincinnati Semi Auto
No. 6 Jackson Die Sinker (3)
No. 1 U.S. Hand, new

PLANERS

72"x72"x16" Cincinnati, 4 bda.
60"x60"x30" Gray, 4 bda., reversing motor drive with motor
26"x26"x8" Gray
24"x24"x12" American
24"x24"x8" Chandler, 1 hd.
22"x22"x5" Pond, 1 hd.

TURRET LATHES

3"x36" J. & L., Chucking
Double Spin. J. & L.
2 1/2"x26" P. & W. Grd. Hd.
No. 6 Brown & Sharpe, Screw
24" Gisholt, 6 1/2" h.s., T.A. (3)
28" Gisholt M.D. 3 1/2" H.S.
No. 6A Potter & Johnstons (2)

MISCELLANEOUS

Bolt Threader, 1"—1 1/2" Landis
M.D. double hd.
Bolt Threader, 2" Landis
Bolt Threader, 1 1/2" Landis
Broach, No. 3 Lapointe
Compressor, 179 cu. ft. M.D.
Chucking, No. 34 New Brit.
Die Sinker, No. 6 Jackson (3)
Flanger, 1/2" McCabe Pneu.
Furnace, Brass, 500 lb.
Furnace, Westinghouse Elec.
Gear Gen., 18" Gleason Revel
Gear Cutter, 60" Gould & Eberhardt
Hammer, 70 lb. Scranton, Power
Hammers, 1500 lb., 1200 lb., 600 lb., McDougall & Potter, steam or air forging
Header, 1 1/2" Acme Rivet
Hobber, 8" Hercules
Jarring Mach., Herman Jolt Mould
Keyst. No. 6 Catlin, 40" stroke up to 5" wide
Keyst., Nos. 1 & 3 Bakers
Keyst., No. 4 M & M. M.D.
Lapper, Norton Type 1C
Pipe Mach., 12" Curtis & C.
Pipe Machs. 3" Stover M.D.
Press, No. 61 Spec. V. & O.
Press, 1000 ton Watson Stillman
Horiz. Hyd. Forcing
Press, No. 58 Perkins S.S. Grd.
Punch & S., No. 91, Size 11
Smith, coping attachment
Punch & S., No. 20 Schatz Type 1 1/2"x1, 4 1/2"x1 angles
Rolls, 12" Corrugating—Heavy
Rotary Table, 28" diameter
Rotary Tables, 26" and 36"
Saw, 6" Gorton No. 2B Inter.
Saw, 10" Espen Lucas Cold
Saw, 10" Nutter Barnes Cold
Saw, No. 2B Cochrane Bly 6"
Saw, No. 15 Lea Simplex
Shaper, 36" Morton, railroad
Slotter, 10" Betts, Cone or M.D.
Slotter, 19" Putnam, heavy
Slotter, 24" Bement, M.D.
Slotter, 48" N.B.P., Grd., M.D.
Testing Machine, 10,000 lb. Tinius Olsen
Wire Straightener, 1/4" Shuster, 20"

BENNETT & RAFFIN CO.

Offices: 30 CHURCH ST., NEW YORK CITY

QUICK

AIR COMPRESSORS

INGERSOLL RANDS—16"x14" & 10"x14" Types
10B & XB, 599 cubic Feet; 10x10

BULLDOZERS

NO. 8 WILLIAMS & WHITE, Cross head 15"
high and 72" long; No. 2 Williams & White
RYERSON KLING DOUBLE END; 14' bed; B.D.
WALBURN-SWENSON; 12" stroke; Motor Dr.
NO. 4 LONG & ALSTATTER; 10" stroke

GRINDERS

CENTERLESS; No. 2 Cincinnati, Motor Drive
SURFACE: Springfield Planer Type, Table
24x51"

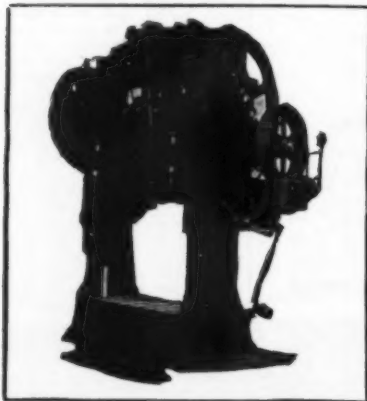
No. 3 Brown & Sharpe Planer Type
No. 2 DIAMOND, Table 16x44"; No. 3 WIL-
MARTH & MORMAN, Table 8x24"

GEAR MACHINERY

NO. 365 GOULD & EBERHARDT, 36x12" G & E
NO. 6-A CINCINNATI, 72"x20"

SPINNING LATHES

24" BLISS, NO. 6 BLISS 30" swing
No. 326 TOLEDO BB, 30" swing; 22" Pry.



FLOOR LATHES

30 FT. PIT LATHE; FACE PLATE
DIAMETER 156"; QUADRUPLE
GEARED; INTERNAL FACE PLATE
DRIVE

27"x16 FT. BRIDGEFORD GEARED HEAD
36"x16 FT. BRIDGEFORD GEARED HEAD
32"x16 FT. BRIDGEFORD GEARED HEAD
26 / 48" x 20 FEET SCHUMACHER & BOYE;
DOUBLE SPINDLE; Back Geared
36"x20 HARRINGTON, 14' bet. centers
52"x22 FT. FIFIELD, Triple back geared
36"x16 FT. SCHUMACHER & BOYE; DBG.
30"x16 FT. FIFIELD LCG., Back geared
30"x18 FT. LODGE & SHIPLEY; Back geared
28/48"x13 FT. HARRINGTON; Dbl. back grd.
22"x12 DAVIS; D.B.G.; Motor Drive
24"x15 FT. NEW HAVEN, LCG., Back geared
24"/44"x18 FT. McCABE DOUBLE SPINDLE
TURRET: 28" POND and 22" LIBBEY

PLATE PLANER

20' NILES; Duplex Cutting Head; Bed area
13 1/2"x21'; T & L pulley drive

PRESSES TOGGLE

NO. 408 BLISS DOUBLE CRANK
TOGGLE DRAWING—84" bet. hous-
ings; Twin drive; 25" plunger stroke;
60" die space; 8" shaft
NO. 409-D BLISS DOUBLE CRANK
TOGGLE DRAWING—108" between
upr.; Tie rod; Twin geared; Air cush-
ions; Plunger stroke 31"; Weight ap-
proximately 215,000 pounds.
NO. 268 1/4 TOLEDO TOGGLE DRAW-
ING—80" between uprights; Plunger
stroke 29"; Blankholder slide stroke
18"; Air cushions
NO. 268 1/4-C TOLEDO, Twin geared;
Tie rod; 87" between housings; Wgt.
approximately 200,000 pounds

INTERSTATE

DELIVERY

MILLS

No. 50 PRODUCTO-MATIC; Indexing table
No. 1/2 VAN NORMAN DUPLEX; Motor drive
No. 5-C BECKER and No. 2 B. & S. VERTICAL
No. 1 KNIGHT VERT.; No. 3 PRATT & WHIT-
NEY DIE SINKER; BILTON CAM MILLER

GANG PUNCHES

No. 2 LONG & ALLSTATTER, 74" bet. hsgs.
No. 5 BERTSCH, 64" between housings
BERTSCH 51 1/2" between housings; Motor. Dr.
2—No. 10 WELLS, 1—34" between 1—73" bet.

SINGLE END PUNCHES

No. 5 1/2 HILLES & JONES; 72" thr., 2" thru 1"
2—No. 4 KLING, 48" throat 3/4" thru 3/4"
2—No. 62 BELOIT, 36" throat; 1/2"x1/4";
Rock River, Ryerson, Aetna, Smith, etc.

CLEARING CRANKLESS TRIPLE ACTION PRESS

4 Point Suspension Type Combined ca-
pacity blankholder and plunger slide
1350 tons; Bed 84"x133"

PRESSES—DOUBLE CRANK

NO. 97-H TOLEDO DOUBLE CRANK—Dou-
ble Geared; 10" stroke; Max. pressure
approximately 650 tons; Wgt. 245,00 lbs.

ALL MOTOR DRIVEN—TIE ROD

No. 93 1/2-F TOLEDO, 6" str.; Bed area 36"x66"
No. 93-H TOLEDO, 12" str.; Bed area 42"x84"
No. 93-E TOLEDO, 12" str.; Bed area 36"x60"
No. 92 1/2 E TOLEDO, 8" str.; Bed area 32"x60"

RIVETERS

STAKE AND PUNCH: Rock River, 36" thr.; B-d.
2—No. 6 WHITING; 3/4" rivet hot, 3/4" rivet
cold; Punch 1/2" hole in 3/4" steel; 50" thro.
PNEUMATIC: Hanna Deep Gap Jaw, 18" gap,
102" reach; 15" gap, 102" reach; 8" gap,
8" reach

FRICTION SAWS

No. 1 RYERSON, 46" Diameter Blade
No. 2 RYERSON, 48" blade
No. 3 RYERSON, Hyd. feed to table
No. 4 RYERSON, Power feed

PIPE THREADERS

12" LANDIS, Cap. 4"-12"; 8 spindle speeds;
Landis Head; Motor Drive
12" STANDARD-WIELAND, Cap. 4"-12"
8" SAUNDERS, Cap. 8" or smaller
4" & 6" SAUNDERS, Landis Die Heads
No. 1 1/2 WILLIAMS, Cap. 3"; Motor Drive

UPSETTER

3 1/2" AJAX, Single geared; Steel Bed; 10"
stroke; Weight approximately 48,000 lbs.



Machinery Co., Inc.

449 W. PERSHING RD., CHICAGO, ILL.

HUNDREDS OF MACHINES READY FOR SHIPMENT

BORING MILLS
Bickford 62" Two Head Vertical
DRILLS
P. & W. Nos. 11, 12, 13 Mult.
Foote Burt No. 17—3 Sp. No. 5 M.T.
Upright Drills—many makes and sizes

GRINDERS
Bryant Nos. 6, 10A, No. 40 Chuck
No. 40 Chuck
Nort. 6x32", 10x36, 10x50"
Landis Nos. 3 & 4 Univ.
Landis 12"x72" Plain
Brown & Sharpe No. 14—7"x48"
Diamond 86" Face, M.D.
P. & W. 12" Vert. Surface
Norton 15"x15"x72" Surface

LATHES
Hendey Lathes—most sizes
McCabe 26" and 42"x14"—2 Spindle
Bullard 26"x30"
Pittsburgh 32"x24", Q.C.E.
Lo-Swing 4"x36", 4"x60", 4"x108"

MILLERS
Brown & Sharpe No. 2 Vertical
Becker No. 3 and No. 5B Vertical
Becker No. 3 Plain, S.P.D.
Hendey Nos. 4 & 5 Vertical
No. 44 Productomatic
Niles 36" Horiz. Slab Miller, table 33"x72"
P. & W. 5" Automatic
Brown & Sharpe No. 10 & No. 12 Production
Potter & Johnston No. 2M Production

PRESSES
Toledo 2000 Ton Cap. Embossing
V. & O. No. 12, 14 D.A.C. In.
Bliss No. 304 Straight Sided
Ferracuta No. 105 D.A.
Terkelsen D-1 150 t. M. Spring
Ferracuta No. PG-P4
W-F Type for cartridges (20)
Danville 4" Stroke Cut Back Frame Shear
W-F 30 Ton Cap. Rack & Pinion, for shells
SCREW MACHINES
Clerc. 1", 1 1/2", 2", 3" Auto.
Potter & Johnston Nos. 5A, 6A Chuckers
New Britain No. 22, 23, 24 Chuckers
Goos & DeLeuw 6"x6 1/2" M.D. Chuckers

MISCELLANEOUS
Broches, LaPointe 1-2-3
Gear Generator—Lees-Bradner No. 5A
Gear Burnisher, Fellows
Hammer—Standard 800 lb. Automatic
Hammers—Chambersburg 1500 lb. Steam
Drop (4)
Header, W-F for 50 Cal. Cartridges—Weight
32000 lbs.
Headers, many sizes & makes
Planer—W-P 42"x42"x12' 3 Head
Planer, W-B 24x24x6
Planer, Sellers 36x36x10
Shapers—From 7" to 32"
Straighteners—Shuster for wire
Swagers—12 in stock
Tester—Riehle 50,000 lb. Hardness
Turret Lathes, J & L 3"

BOTWINIK BROTHERS, INC.

353 Welton Street,

New Haven, Conn.

REBUILT MACHINE TOOLS — — and we DO mean R-E-B-U-I-L-T

GRINDERS

- 1—10x48" Cincinnati universal grinder, 3 motor drive
- 2—12x36" Cincinnati plain cylindrical grinders, 3 motor drive
- 1—No. 14 Brown & Sharpe plain cyl. grdr., 10" swing, max. distance bet. centers, 30", 3 m.d.
- 1—No. 14 Brown & Sharpe plain cyl. grdr., 16" swing, 48" max. distance bet. centers, 3 m.d.
- 1—6x32" Norton plain cyl. grinder 3 m.d.
- 1—Arter automatic rotary surface grinder, dia. of magnetic chk. 3 1/2" with piston ring grdg. at.
- 1—Wilmarth & Morman New Yankee Drill grinder, arranged for motor drive

TURRET LATHES

- 3—3x36" Jones & Lamson sgl. spdl. flat turret lathes, s.p.d. with cross sliding head
- 1—3 1/2"x26" Jones & Lamson dbl. spdl. flat turret lathe sgl. pulley drive with cross sliding hd.
- 1—18" swing Libby Saddle type turret lathe, motor drive, all geared head, all power feeds to hexagon turret and to cross slide
- 2—24" Gisholt turret lathes, motor drive, power feeds to hexagon turret and to cross slide, hole through spindle 1 machine 6 1/2", other machine 3 1/2"

LATHES

- 1—12"x4" Hendey tool room lathe, cone drive, quick change gear, collet attachment
- 1—12"x5" Hendey tool room lathe, Cullman drive, motorized quick change gears, taper attach.
- 1—24"x10" Schumacher & Boye double back geared, quick change gear engine lathe

GEAR MACHINERY

- 1—No. 3 Pfauter (Schuchardt & Schutte) gear hobber for spur and spiral gears, and worm wheels up to 20" diameter

BORING MILLS

- 1—3" Morris horizontal boring mill, motor drive through gear box, all geared spindle speeds
- 1—42" Bullard vertical boring mill, motor drive through gear boxes with one plain swivel head and with one turret head on cross rail

MISCELLANEOUS

- 1—Nasco 20 spindle drill press, motor drive with motor
- 1—No. 3 Thiel filing and sawing machine
- 1—No. 0 LaPointe Broaching Machine

LAURENS BROS.,

SEVENTIETH AT LONGVIEW
CINCINNATI, OHIO - - VALLEY 7200

HIGH GRADE TOOLS

AUTOMATICS

- 1" Cleveland Model J double end threading, pointing, turning or drilling
- 1 1/2" Cleveland Model M, 4-spdle.
- 1 1/2" No. 55 Nath. Acme 4 spdle.
- 2" Cleveland Model A
- No. 33 New Britain chucking
- No. 34 New Britain chucking

AIR COMPRESSORS

- 136", 8"x8" Chicago Pneumatic Tool Co., type NSB.
- 136", 8"x8" Ingersoll Rand, type ER1
- 357", 12"x10" Bury, class HL
- 550", Natl. 3-cylinder, vertical
- 620", 14" x 8 1/2" x 10" Sullivan, class WJ3, angle compound, 2 stage, synchronous motor
- 706", 17" x 9 1/2" x 12" Sullivan, class WJ3 angle compound, 2 stage
- 868", 17" x 10" x 12" Chicago Pneumatic Tool Co., type OCB, 2 stage
- 20"x12"x14" Sullivan

BRAKES

- 4"x1" Cincinnati Press Brake with many dies

BROACHES

- No. 1 LaPointe, screw type
- No. 2 LaPointe
- No. 2 Standard screw type Broaching press
- No. 3 J. N. LaPointe dbl. screw type
- No. 3 American high speed, rack type
- No. 4 LaPointe of Hudson, scr. type
- 2 ton American vertical

DIAMOND BORERS

- Two spindle Coulter vertical. For single or double spindle operation. Motor in base type
- Ex-Cell-O 9-spindle radial

GEAR CUTTERS

- No. 18H Gould & Eberhardt universal gear hobber
- 12"x13" No. 12HS Gould & Eberhardt Mig. hobber
- 24" No. 3 Adams Farwell gear hobber
- 8"x10" No. 1 Lees Bradner production hobber
- 14"x8" No. 5A Lees Bradner universal hobbors
- 26"x8" No. 3 Brown & Sharpe auto spur
- 48"x10" No. 4 Brown & Sharpe automatic spur
- 15" Gleason bevel gear quencher

- Gleason bevel gear tester
- Gleason circular finishing cutters, without blades
- Natl. Tool Co. (Cleveland) Mod. B gear and gear shaper cutter checking machine
- Lipe gear tooth chamfering machine, double spindle
- No. 2 Schuchardt & Schutte automatic hob grinder
- No. 3 Barber Colman gear hobber
- 60" No. 5A Cincinnati Auto.

ENGINE LATHES

- 14"x6" Hendey
- 14"x8" Lodge & Shipley
- 14"x8" Monarch
- 16"x6" Cincinnati
- 16"x10" Monarch
- 18"x8" American
- 18"x8" Walcott
- 18"x8" Monarch
- 18"x8" Whitcomb Blaindell
- 19"x8" Sidney
- 20" (22") x10' Davis, dbl. b-gd.
- 24"x10 1/2" New Haven std. chg.
- gear
- 24"x10" Reed Prentice
- 24"x12" Lodge & Shipley
- 24"x16" Schumacher & Boye dbl. back gears, taper att.
- 36"-43"x18" New Haven Q.C.G.
- 36"-47 1/2"x21 1/2" Wickes Q.L.G.

LATHES, TURRET

- 14" Warner Swasey
- No. 3 Woods tilted turret
- No. 4 Bardsons and Oliver
- 21"x24" & 3"x36" Jones & L.
- 21" & 28" Steindle

LATHES, PRODUCTION

- 13"x6" Automatic thread. lathes, geared head
- 16"x10" LeBlond rapid product.
- 16"x5" Monarch Mfg. or rapid production
- 17"x5 1/2" Wickes selective geared
- 18"x7"-6" Wickes geared head, rapid production
- 20"x10" LeBlond geared head with 2 carriages
- Melling 4-cylinder Camshaft lathe
- Melling 6 cyl. Crankshaft lathe
- 34"x61 1/2" between spdls. Wickes semi-auto. center dr. crkshaft.
- 9"x14" Porter Cable

MILLING MACHINES

- 36" Niles vertical car wheel borer
- 60" Colburn
- No. 3 1/2 Fox hand
- No. AB Becker vert.
- Nos. 1 & 1 1/2 Knight vertical
- 60" Ingersoll rotary
- Nos. 1 & 1A Davis & Thompson

- No. 45 Bilton Productomatic
- No. 10 Bilton Productomatic
- 12" Cincinnati plain Mig.
- No. 33 Kempsmith Mig.
- No. 30 Sundstrand Rigmil
- 25"x25"x14" Ingersoll Slab
- No. 3C Lees Brad. col. type thd.
- Hall Planetary Thread Miller
- Walcott Supermill

SHAPERS

- 16" Walcott
- 16" Hendey
- 22" Ohio
- 24" Rockford
- 36" Morton draw cut

WELDERS

- 12 KVA American Electric Fusion, type BW 16, 440 V., spot, 14" reach
- 17 KVA Thomson Gibb, type D 18-17, 440 V., spot, 19" reh.
- 20 KVA Agnew, type 10D, 440 V., spot, air or foot operated, 16" reach
- 20 KVA Taylor, 440 V., spot, 14" reach
- 20 KVA Taylor, 220 V., spot, 22" reach
- 20 KW Taylor Maesta, 440 V., portable gun type spot
- 20 KW National spot, 28" reach 220 Volt
- 23 KVA Winfield, type S 18 M-SH, 440 V., spot, 21" reh.
- 25 KW Winfield, type BS, 220 V. butt
- 35 KW Federal, type 60, 440 V., automatic upset butt
- 65 KW Federal, type 10A, 440 V., butt
- 75 KVA Federal, type 61, 440 V., mechanical upset air clamping flash butt
- 150 KVA American Electric Fusion, type HJ 10, 440 volt, air operated multiple welder
- 150 KVA Swift flash butt welder, 440 Volt

MISCELLANEOUS

- Bulldozers, Nos. 5, 6 & 29 Williams & White
- Keyscater, 2 1/2" No. 4 Mitts & Merrill
- Rolls, 54" McKay Sheet leveler
- Cylinder borer, No. 10D Moline holehog
- Degreaser, Conveyor & Spray type
- Degreaser, Blakeslee
- Die Caster, A.C.
- Swagers, No. 208 Etna and No. 6 Langelier

WHAT HAVE YOU FOR SALE?

MILES MACHINERY CO., SAGINAW, MICH.

IMMEDIATE DELIVERY

CHUCKS, 3 Jaws with Extra Set of Jaws, 4", 5", 6", 8", 9", 10", 12".

CHUCKS, 4 Jaws, 6", 7½", 10", 12", 14", 16", 18".

SLITTING SAWS, H. S. Complete line from 2½" to 8".

DRILL CHUCKS, from ¼" to 1".

JOBBER DRILLS, H. S. 1/16" to ½" by 64ths.

WIRE GAUGE DRILLS, H. S. 1 to 60.

DRILLS H. S. 12" Long, 9" Cutting Flutes, 7/32" to ½" by 64ths.

DRILLS, Straight Shank Taper Length, ⅛" to ½" by 64ths.

High Speed Tool Bits—Carbide Tip Bits—Milling Machine Vises—Magnetic Chucks—Lathe Mandrels—Drill Rod—Ground Flat Stock—Bench Vises—Inserted Tooth Cutters—Inserted Tooth Face Cutters—Diamond Emery Wheel Dressers—H. S. and Carbide Tip Lathe Centres—B & S Sleeves—Morse Drill Sleeves—Electric Drills.

SEND FOR OUR CIRCULARS

VICTOR MACHINERY EXCHANGE, INC.

251 Centre St.,

New York, N. Y.

HIGH SPEED

STRAIGHT SHANK TWIST DRILLS

Jobbers or Short Length

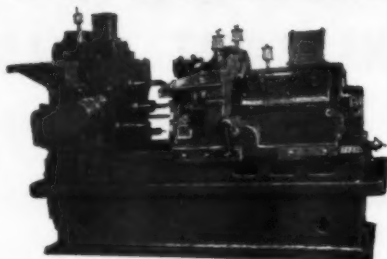


Size Inches	Our Price Per Dozen High Speed	Length Overall Inches
1/16	\$ 1.80	2 1/2
5/64	1.86	2 5/8
3/32	1.92	2 3/4
7/64	2.04	2 7/8
1/8	2.16	3
9/64	2.34	3 1/8
5/32	2.52	3 1/4
11/64	2.70	3 3/8
3/16	2.91	3 1/2
13/64	3.15	3 5/8
7/32	3.45	3 3/4
15/64	3.75	3 7/8
1/4	4.05	4
17/64	4.50	4 1/8
9/32	4.95	4 1/4
19/64	5.40	4 3/8
5/16	5.85	4 1/2
21/64	6.45	4 5/8
11/32	7.05	4 3/4
23/64	7.65	4 7/8
3/8	8.25	5
25/64	9.00	5 1/8
13/32	9.75	5 1/4
27/64	10.50	5 3/8
7/16	11.25	5 1/2
29/64	12.00	5 5/8
15/32	12.75	5 3/4
31/64	13.65	5 7/8
1/2	14.55	6

SEND FOR OUR CIRCULARS

VICTOR MACHINERY EXCHANGE, INC.
251 Centre St., **New York, N. Y.**

Goss and De Leeuw Chuckers



Actual Photograph

Capacity $8\frac{1}{2}$ in. diameter
x 8 in. long.

5 Chucks on the turret.

Maximum distance spindle
nose to face of turret
 $23\frac{3}{4}$ in.

Threading spindle control-
led by positive lead screw.

Arranged for motor drive.

Weight about 12,000 lbs.

This is a high production multiple spindle automatic chucking machine for drilling, reaming, boring, facing, threading or tapping irregularly shaped parts.

LOUIS E. EMERMAN & CO.
1761 Elston Ave., Chicago, Ill.

READY TO SHIP

LANDIS BOLT THREADING MACHINES

$1\frac{1}{2}$ " capacity 1 and 2 Spindles. Motor Drive.

OHL POWER SQUARING SHEAR, 10 ft. by 10 gage.

REID No. 3 SURFACE GRINDERS capacity
 $32'' \times 12'' \times 12''$ Motor Drive.

FELLOWS GEAR SHAPERS 24" and No. 3.

LEBLOND 29" and 12' **SCREW CUTTING**
LATHE Removable Ga, Dbl. Back Gears.

PRATT & WHITNEY No. 12 Two Spindle
Profiler.

BROWN & SHARPE No. 0Y **MILLER**
geared Speeds Motor Drive.

MORRIS MACHINERY CO., Inc.
93-105 Chestnut Street, Newark, N. J.

HIGH GRADE TOOLS

LATHES

- 14"x6" American Bowl Hd. 4 S.C.D.
B.G. Q.C.
16"x8" Hendey Lathe, 4 S.C.D. B.G.
T.A. Q.C.
18"x8" Mueller Lathe, 3 S.C.D. D.B.
G. Q.C.
18"x8" Sidney Lathe, 3 S.C.D. B.B.G.
Q.C.
18"x8" American Lathe, 3 S.C.D. D.
B.G. Q.C.
18"x8" American Lathe, 3 S.C.D. D.
B.G. Motor driven
18"x8" Greaves Klusman Grd. Hd.
Lathe Q.C. T.A.
18"x8" Greaves Klusman Grd. Hd.
Lathe, Q.C. M.D.
18"x8" Boye & Emmes 3 S.C.D. D. B.
G. Q.C.
18"x8" LeBlond 3 S.C.D. D.B.G. Q.
C. motorized
19"x12" Sidney H.D. 3 S.C.D. D.B.G.
T.A. Q.C.
20"x16" Greaves Klusman Grd. Hd.
Q.C. T.A.
21"x8" LeBlond H.D. 3 S.C.D. D.B.
G. Q.C.
24"x10" Lodge & Shipley 3 S.C.D. D.
B.G. Q.C.
25"x16" LeBlond H.D. 3 S.C.D. D.B.
G. Q.C.
36"x20" Putnam 5 S.C.D. B.G.
42"x16" Boye & Emmes H.D. 5 S.C.D.
Trip. Grd. Q.C.

PLANERS

- 36"x36"x10" Detrick & Harvey Open-
side Belt Drive

RADIAL DRILLS

- 3' Morris Plain Radial Drill S.P.D.
2-4' Bickfd. Pl. Radial Drills, S.P.D.
6' Bickford Pl. Radial Drill. S.P.D.

GEAR MACHINERY

- No. 3-26" B & S Automa. Gear Cut.
No. 1 Adams Farwell Gear Hobber
No. 3 Adams Farwell Gear Hobber

SHAPERS

- 24" Rockford H.D. Cone Drive
24" Steptoe H.D. Cone Drive

HORIZONTAL MILLS

- 3" Lambert Horizontal S.P.D.

GRINDERS

- 12"x36" Landis Self Contained Plain
14"x72" Queen City Self Cont. Plain
16"x52" Landis Crankshaft Grinding
Machine, M.D.
No. 55 Heald Internal Grinders
Cataract Precision Grinder
No. 51 Oliver Drill Grinder M.D.
No. 5 Oliver Drill Grinder M.D.
No. 29-53" Besley Disc Grinder
12" Pratt & Whitney Surf. Grinder

TURRET LATHES

- No. 2 Warner & Swasey Tur. Lathe
1½" Millholland Turret Lathe

MISCELLANEOUS

- No. 35 Niagara Presses, Belt Drive
Quickwork Rotary Shear
No. 1 Klemm Metal Band Saw
Atkins Metal Cutting Back Saw
35 K.W. Federal Spot Welder
No. 1 Baker Keyseating Machine
2" Acme Bolt Cutter
2" Landis Bolt Cut. with Lead Scrw.
No. 1 LaPointe Broaching Machine
2" Landis Pipe Threading Machine
C12 Natco Multiple Drill
20 spindle No. 2 M.T. Natco Drill
1" Roller Pipe Cutting Machine
Savage 3/16" Nibbler
Savage ¾" Nibbler

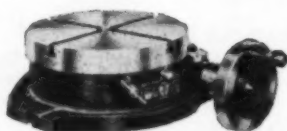
CINCINNATI MACHINERY & SUPPLY CO.

217 EAST SECOND STREET

CINCINNATI, OHIO

**BRAND NEW
PRECISION**

ROTARY TABLES



9"	-	\$ 97.00
12"	-	160.00
15"	-	185.00
18"	-	220.00
18"	-	350.00 HEAVY DUTY
21"	-	500.00 HEAVY DUTY
25"	-	590.00 HEAVY DUTY

OUR ROTARY TABLE WILL TAKE THE PLACE OF A COSTLY FIXTURE. IT IS USED FOR ALL KINDS OF WORK ON MILLING MACHINES, SHAPERS, DRILL PRESSES AND HORIZONTAL BORING MILLS.

WE CAN ALSO FURNISH DIVIDING ATTACHMENTS.

SEND FOR LITERATURE AND DETAILS.

FAST DELIVERY GUARANTEED.

LAFAYETTE TOOL & SUPPLY CO.

178 LAFAYETTE ST.

NEW YORK, N. Y.

SEND FOR LITERATURE ON OUR OTHER PRODUCTS.

OTT MACHINERY SPECIALS

AUTOMATICS:

Brown & Sharpe, No. 00 Cutoff
Cleveland, Model A, $\frac{5}{8}$ "- $\frac{3}{4}$ " & $\frac{7}{8}$ "-1 $\frac{1}{4}$ "
Cleveland, Model B, 2" with 18 feed
Gridley, 2 $\frac{1}{4}$ " & 3 $\frac{1}{4}$ " & 23 Single Spindle
New Britain, No. 22
Automatic Threading Lathes, 13"x6" G.H.

BORING MILLS, 42" Bullard, 2 Swivel Hds.
Moline Cylinder Borer, No. 10D 8 Spdl.

DRILLS, Edlund

Barush & Natco Multiple spindles
Morris, 4" Radial M.D.
Henry & Wright, 1 to 8 Spdl., No. 2 mt.

GEAR CUTTERS, Fellows No. 6 Shaper

GEAR HOBBER, Barber-Colman No. 3 & 12

GRINDERS, B & S No. 12 & 16 Plain

Heald No. 65 Cylinder
Landis, 10x36 Hydraulic, M.D.
Norton, 16x36" Crankshaft
Norton, 10x24 & 36" Plain

LAPPERS, No. 10 & 15 Norton, M.D.

LATHES, Hendey, 18x10', T.A.
Jones & Lamson, 3x36" M.D.
Lodge & Shipley, 16x6, M.D.

MILLS, Becker, Vertical, No. 4B
Ingersoll, 32" between housings, Table
24x72, M.D.

PRESSES, No. 94 Bliss, Solid Back
No. 68N Bliss Double Action Cam
No. P 3 & 4, & P G 2 Fer., Solid Back
No. 34 & 35 Toledo Solid Back, Geared

PLANERS, 26"x26"x5' Gray, M.D.
30"x30"x8" Cincinnati, M.D.
44"x44"x18" Niles, 4 Heads

PROFILERS, L & G No. 13 Single Spindle

SHAPERS, 16" Gould & Eberhardt, M.D.
24" Queen City, Gear box, M.D.

TAPPERS, No. 1, 2 & 2X Garvin
6 Spdl. Holmes Tilted No. 3
5 Spdl. Webster & Perks Vertical

OTT MACHINERY SALES, Inc.

548 Second Ave.,

DETROIT, MICHIGAN

HILL-CLARKE QUALITY

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No. 1—1 spdl. Leland-Gifford
1 spdl. Henry & Wright
2 spdl. Leland-Gifford Bench
2 spdl. Henry & Wright
4 spdl. Sigourney
4 spdl. Henry & Wright
6 spdl. Henry & Wright
No. 3 Baker 2 Spdl. Cyl. Borer
No. 5D Moline 4 Spdl. Cyl. Borer
24"—2 spdl. Foote-Burt
No. 17—2 Spdl. Foote-Burt Rail
No. 1 Baush Multiple

GEAR CUTTERS

No. 2—6" Bilton
No. 1/2, Pfauter Hobber
No. 4—36" Brown & Sharpe
No. 4—48" Brown & Sharpe
No. 5—48" Brown & Sharpe
96" Newton Spur Gear

GRINDERS

**HILL-CLARKE PRODUCTION UNIVERSAL
MOTOR DRIVEN**

12" x 36" 12" x 50" 12" x 72"
(See page 350—special advertisement)
Hill-Clarke Cylindrical Grinders

No. 40 Bryant Wide Wheel, Oscilating
No. 5 Springfield Planer Surface
No. 18 Bryant Internal
No. 60 Heald Cylinder
No. 10 Lees-Bradner Spur Gear
Grinder
24" Cincinnati Face Mill

MFG. LATHES

3 1/2"x108" Fitchburg Lo-Swing
No. 4AC LeBlond Auto. Crankshaft

ENGINE LATHES

14"x6" LeBlond
16"x6" Hendey
16"x8" Hendey
26"x10" Bridgeford Plain Turning
20"-40"x10" Rahn-Larmon Geared
Head Sliding Bed Gap
30"x12" Whitcomb-Blaisdell

SHAPERS AND PLANERS

16" Gould & Eberhardt Shaper
24"x24"x6" Powell
24"x24"x12" Gray
30"x30"x8" Powell
36"x36"x8" Cincinnati
36"x36"x12" American 2 hds.
36"x36"x18" Cincinnati

PRESSES

No. 303 Bliss S.S., Geared
No. 42 1/2 Pels Beam Shear

TURRET LATHES

2 1/4"x26" Greenlee, Cross Sliding
Turret
2 1/4"x26" Greenlee, A.C. and R.F.
24" Steinle, 6 1/4" H.S.

MISCELLANEOUS

No. 3-B J. N. La Pointe Broach
No. 4 J. N. La Pointe Broach
6" Saunders Pipe Machine
12" Bignall & Keeler Pipe Mach.
60" Quickwork Rotary Shear
No. 1 Garvin Tapper
No. 4 Gaterman Pneumatic Tapper

HILL-CLARKE MACHINERY CO.
645 W. WASHINGTON BOULEVARD, CHICAGO

REBUILT MACHINE TOOLS AVAILABLE FOR SHIPMENT

MILLING MACHINES

No. 3 Fox Hand Milling Machine
No. 1 Plain Steptoe, back geared
No. 1 Milwaukee g.h., mtr. dr.
No. 2 Kempsmith, universal dividing head
No. 2 Cincinnati, universal dividing head
No. 2 Cincinnati plain, p. fds., vert. att.
No. 3 Becker, univ., div. hd., mtr. dr.
No. 5 Becker Vert. Mill
8" Pratt & Whitney, automatic
No. 12 Brown & Sharpe Production, table
6x30

LATHES

16"x8" Hendey Lathe, qd. hd., q.c.g., box
18"x10" Hendey Lathe, q.c.g. box
18"x22"x10" Fay & Scott Lathe, gap bed,
direct motor drive
26"x10" Whitcomb Blaisdell Lathe, q.c.g.
28"x14" Putnam Lathe
48"x20" Fitchburg Lathe

TURRET LATHES

Millholland, 1½" bar feed
No. 4 B. & O., 1½" cap., 2 p. fds., bar fds.
No. 6 Bardons & Oliver, 3" capacity, pwr.
feed, bar feed
1½" Warner & Swasey, power fd., bar fd.
No. 6 Warner & Swasey, p. fd., bar feed

Graham Machine Tool, Inc. 231 CENTRE STREET,
TEL. WORTH 4-8125 NEW YORK, N.Y.

2½" and 3½" Gisholts, 2 p. fds.
3"x36" Jones & Lamson, single pulley dr.

SHAPERS & PLANERS

18" Gould & Eberhard Shaper, Dir. M.D.
20" Kelly Shaper, direct motor drive
24" Gould & Eberhard Shaper, Dir. M.D.
Betts Planer, 36x36x12", 2 swiv. heads
Cincinnati Planer, 60x60x10", 3 hds.

GRINDERS

12x36" Cinc. Grinder, univ., p. fds. thru
gear box
6x18" Landis, self-contained motor drive
6x18" Ott, universal
No. 2 Brown & Sharpe Surface Grinder,
motor in the base
No. 3 Van Norman, 6"x9", internal
No. 75 Heald Internal Grinder

New 6x18" Surface Grinders, motor
in base

MISCELLANEOUS

Hilles & Jones, 1" cap., 36" gap, Shear &
Punch
Single Frame Hammer, 220 lbs. cap., m.d.
No. 3 Ferracute Press

NEED GOOD TOOLS? — SEE US FIRST

D-31 Fox multiple drill, rectangular head, 16"x31½" spindle centers. No. 2 Morse taper;
10 spindles, hand and power feed to head.

DIES and MACHINES for rect. cans, inc.
61 Ams flanger; 72 Ams double seamer;
126CD Adriance double seamer; 281
Adriance gang slitter; No. 114 Adriance
Automatic Double Seamer 10" round
cans.

DRILLS, 36" Cincinnati, back geared slid-
ing head, tapping attachment; No. 4
Quint six spindle turret drill; No. 4
Morse tapers

HAMMER, 300 lb. Standard Auto.

ENGINE LATHES, One 9"x20" Porter Ca-
ble Production lathes with back facing
attachment

GRINDER, 12x36 Modern Self Cont. Plain

HAMMERS, 60 lb. Bradley Helve; Drop
Hammer, 300 lb. Standard Automatic

MILLING MACHINES, No. 2 Clough, ver-

tical mill; No. 1 Newton slab, 65" ta-
ble feed

TAPPING MACHINE, Automatic No. 2X
Garvin

TURRET & MONITOR LATHES, No. 1 Am.
Tool & Mach., Fox Monitor chasing bar

PLANERS, 24"x6" Pond, one head

PIPE MACHINES, 3" Bignall & Keeler; 4"
Saunders; both belt drive.

PRESSES, One No. 40 Bliss horn

SAND BLAST, C-36 New Haven 36"x44"
Radial Sand Blast Barrel M.D.

SEPARATOR, Large Oil Separator, with
hoist; 3 McKenzie chip production

WIRE STRAIGHTENER, ¼" Shuster, 10 ft.
Cutoff

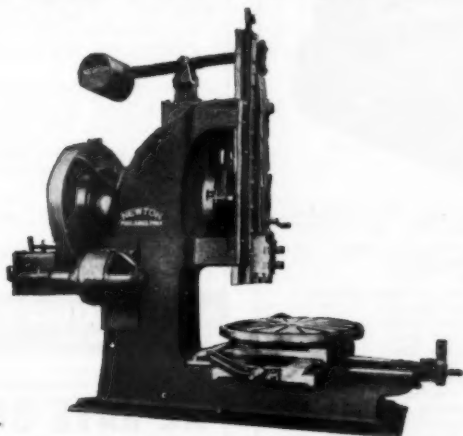
Many other tools—exceptional "buys"—write for full details.

A. D. White Mch. Co., 108 N. Jefferson St., Chicago, Ill.
Established 1894

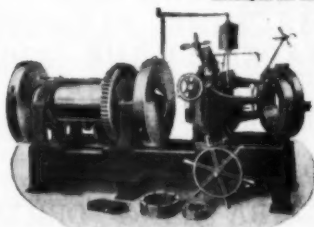
"The Used Machinery House Known Everywhere" McCabe & Sheeran Machinery Corp.

LARGE TOOLS LIKE THESE

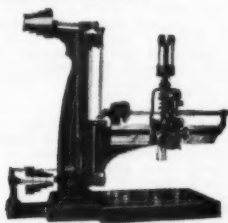
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SLOTTER—26-in. stroke, "Newton", with speed-box—
Arranged for constant speed motor-drive, no motors



PIPE MACHINE—10-in. capacity—with expanding die heads, chasers, etc. "Sounders"



RADIAL DRILL—6-ft. arm. Heavy duty, with table—"Band". Arranged for constant speed motor-drive, no motor.

LARGE LATHES—84-in. swing, 36-ft. bed. 90-in. swing, 20-ft. bed.

OTHERS—listed in 10-page Big Broadside bulletin now off the press—write.

McCABE & SHEERAN
MACHINERY CORPORATION

(REG. U. S. PATENT OFFICE)

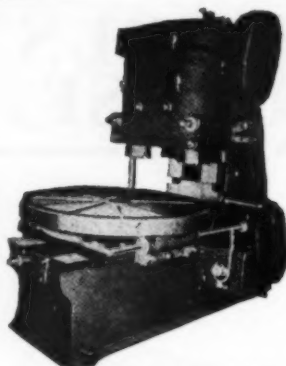
50 Church Street,

Phones: COViland 7-3463, 7-3464

New York

Cable address: Macsheeran, New York

Printed in U. S. A.



No. C28 Newton Two Spindle
Rotary Milling Mch. (54" Table)

- 1 No. 84 Gardner Opposed Disc
- 2 No. 65 Heald Grinders
- 1 No. 8 Bealy Disc
- 1 No. 14 Brown and Sharpe Grinder
- 1 Greenfield Cutter Grinder
- 2 24" Steinkamp Turret Lathes
- 1 No. 6D Moline Hole Hog
- 1 No. 7D Moline Hole Hog
- 1 17"x8" LeBlond Engine Lathe
- 1 28"x10" New Haven Engine Lathe
- 1 17"x8" LeBlond Production Lathe
- 1 14"x6" Reed Prentice Geared Hd. Lathe
- 1 14"x19" Fay Automatic Lathe
- 1 36" Cincinnati Horizontal Borer
- 1 4" Niles Horizontal Boring Mill
- 2 No. 3 LaPointe Broaches
- 1 No. 1 Davis & Thompson Continuous
Drum Type Mill
- 1 36x36x12" Ingersoll Planer Type Mill (4
Heads)
- 1 24x24x6 Ingersoll Mill—2 Heads
- 1 24"x24"x6 Ingersoll Slab Mill
- 1 5' American Radial Drill
- 1 5 1/2" High Speed Hammer
- 1 2A High Speed Hammer
- 100 2, 3 and 4 Ton Chain Hoists
- 1 Gridley 1 1/4"—4 Spdl. Screw Machine
- 1 20" Gould & Eberhardt Shaper
- 1 36" Fellows Gear Shaper
- 1 1F Norton Lapper
- 1 4" Ajax Upsetter
- 1 No. 0 Ajax Forging Roll
- 2 Ajax Rivet Headers
- 1 No. 2 Garvin Tapper
- 1 100,000 lb. Riehle Testing Machine
- 2 275 Ton Hydraulic Presses, 4 post type

DONBERG  **DANITS**
MACHINE TOOLS

400 S. Clinton St., Chicago, Ill.
Phone: Wabash 0123

Turret Lathes: Warner & Swasey No. 1
Plain Head H.F. for chucking
Cleveland Model A—1 1/2 Single Spindle
Milling Machines: Osterlein No. 1 Plain
Putnam Semi Automatic Lincoln Type
Lathes: Monarch 12x5 Geared Head, M.D.
Monarch 14x6 D.B.G. M.D.
Monarch 20x8 D.B.G.
Lehman 20x14 D.B.G.
Lodge & Shipley 16x8 D.B.G.
Grinders: Abrasive No. 33, M.D.
Cincinnati 12x20 Plain, c/s.
Drills: Moline 4 spindle Hole Hog, M.D.
Barnes Double End Horizontal Radial
Drill
Barnes Single End Horizontal Radial
Drill
Rockford 24" Sliding Head Drill
Barnes 21" Sliding Head Drill
Punch Presses: Bliss Consolidated O.B.I.
No. 3 & No. 4, M.D.
Minster No. 4 & No. 5 O.B.I. M.D.
Niagara 4 1/2x5 O.B.I. M.D.
Bliss No. 3A S.S. M.D.
Bliss No. 22 Horn M.D.
Booth Straight Side Press
Gear Machinery: G & E No. 36B for Spur
and Bevel Gears

PARTIAL LISTING—WRITE FOR
COMPLETE STOCK LIST

ACME EQUIPMENT CO.
128 S. Clinton St., Chicago, Ill.

WE HAVE ON HAND

SPECIAL SIZE
MACHINE REAMERS,
TAPER SHANK AND
STRAIGHT SHANK,
UNDERSIZE AND OVERSIZE
1/8" TO 1 1/4".

ALSO
EXTRA LONG DRILLS
AND SPECIAL TAP
DIES.

Send Your Inquiries

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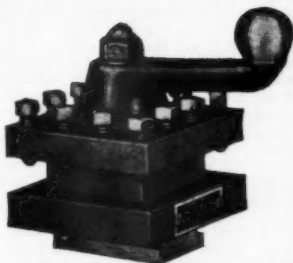
TOOL POST TURRET

Thousands of satisfied dealers and users repeat orders attest to the high standards which govern the manufacture of these high grade tools.

These tool post turrets are firmly held in position by an integral key which is tailored to fit compound rest on your particular lathe. Held down by a nickel alloy steel stud tapped into a "T" nut in the compound rest slot. A hardened acorn nut on top permits tightening rigidly.

We do not recommend the use of tool holders, but prefer tool bits held directly in slot of turret for maximum rigidity.

Any Turret may be milled to fit square on lathe when compound rest is at 30° or 45° at regular prices.



Model "31" Tool Post Turret

Model "61"

Eight position indexing, of massive proportions, making this model adaptable for lathes up to 24-inch swing. Custom built to your requirements.

Block is 5¾ inches square. Hardened alloy steel (48 Rockwell C). Holding screws ½-inch-13-inch, hardened.

Weight, approximately 35 lbs.

Price \$99.00 Prepaid

Model "41"

Adaptable for use on Lathes up to 16-inch swing. Four position indexing, or may be had in eight positions at an optional charge of \$3.00.

Block 4 inches square, case hardened steel, mottled finish. Holding screws ¾-inch by 18-inch, hardened.

Takes tool steel ¾ inches square or smaller, by the use of shims.

Weight, approximately 15 lbs.

Price \$49.50 Prepaid

Model "31"

Made especially for Bench Lathes and small Engine Lathes up to 12-inch swing, and are widely used on Hand Screw Machines. Block 3 inches square, case hardened, mottled finish.

Four position indexing, or may be had in eight positions at an optional charge of \$3.00.

Made to use tool steel ¾ inches square or smaller, by employing shims.

Weight, approximately 5 lbs.

Price \$25.00 Prepaid

INSTRUCTIONS FOR ORDERING TOOL POST TURRETS

MAKE OF LATHE.....
SWING OF LATHE.....

Model "61"

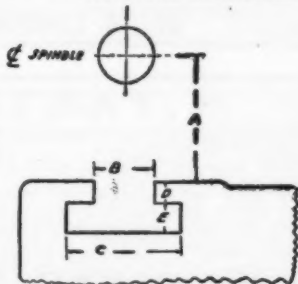
Specify size of tool bits to be used. Supply dimensions required in cut.

Model "41"

Supply dimensions required. If dimension "A" is over 2½ inches add \$3.00 to price. If dimension "A" is less than 1-7/16-inch specify Model 31. For eight position indexing, please specify and add \$3.00 to price.

Model "31"

Supply dimensions required. If dimension "A" is over 1¾ inches add \$3.00 to price, or specify Model 41. For eight position, please specify and add \$3.00 to price.



LAFAYETTE TOOL & SUPPLY CO.

178 LAFAYETTE ST.,

NEW YORK, N. Y.

SEND FOR LITERATURE ON OUR OTHER PRODUCTS

Ridgeway 74"x74"x32' Planer
 Detrick & Harvey 42"x42"x10' Planer Opens.
 Cleveland 42"x42"x18' Closed Side Planer
 Universal Milling Machine: No. 2 Cincinnati
 Milling Machine: No. 3 Cincinnati Plain
 Milling Machine: No. 4 Becker Vertical
 Turret Lathes: No. 2 Warner & Swasey (3)
 Turret Lathes: No. 3 Warner & Swasey
 Turret Lathes: No. 6 Warner & Swasey
 Turret Lathes: No. 4
 Lathe: 18"x8' Monarch, Q.C., back geared
 Lathe: 18"x8' Hendey, Q.C., yoke head
 Lathe: 16"x10' Whitcomb Blaisdell, Q.C.
 Engine Lathe: 12"x8' W.C. Young, B.G., Q.C.
 Radial Drill: 4' Universal
 Press: Power, Bliss No. 0, Stiles, C.B.
 Press: Power, Bliss No. 4, Stiles, C.B.
 Shapers: 24", 20", 16", G. & E.
 Shaper: 20" Suptoe
 Cyl. Grinders: No. 3 Modern Universal (8)
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42" Bullard, one plain swivel
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LATHES

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17x8 South Bend C.P.D.
17x10 South Bend C.P.D.
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2-18x8 Morris, 3 step. D.B.G.
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selective geared head with
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No. 6 Brown and Sharpe
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No. 4 Brown & Sharpe

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25 cycle
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Welders 25 cycle
1-G.E. 200 AMP. Arc Welder
25 cycle
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206 A Oster 6" Capacity
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3x36 J. & L. for bar and chucking
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 No. 3 Acme H.G., M.D. Universal
 No. 9 Foster 3" capacity

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 3x26 Brown & Sharpe
 36" Brainard

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 52 National Acme
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5' Cin. Bickford Fully Univ. Single Pulley Driven Radial Drill

3' Morris

3½' Prentice
 2½' American
 2½' Simplex

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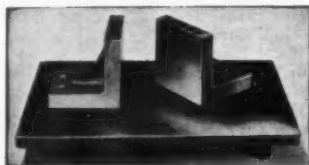
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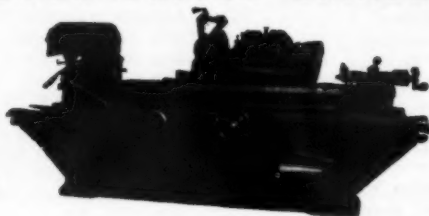
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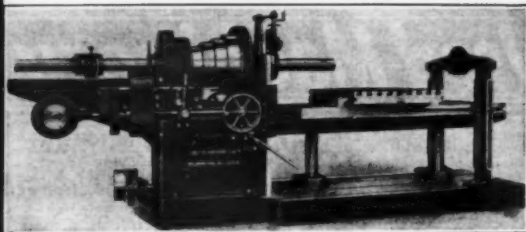
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15" x 7' South Bend
16" x 10' Monarch

TURRET LATHES

1—30" Warner & Swasey Vertical Turret Lathe

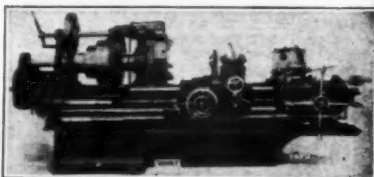
Capitol Machinery Exchange 1342 Atlantic Ave.,
Brooklyn, N. Y.



4½" BETTS HORIZONTAL BORING MILL

Chuckling Machine, 5A Potter
& Johnson.
Grinder, Cyl. 10"x 20" Landis.
Automatics, 1, 4, 5, Spindles,
Acmes & Cleavelands ½" to
1"; 00 Brown & Sharpe.
Turret Lathes, hand ¾" to 1½";
2¼x24 J. & L.

24" GISHOLT TURRET LATHE—4½" HOLE THRU SPINDLE POWER RAPID TRAVERSE



Inland Machinery Company

41 So Clinton St. Chicago, Ill.

Air Compressor, 12x10 Bess. 232 CFM. B.D.
Air Comp., Cent., Ing. Rand 10 HP. motor
3/60/220
Buffer and Grinder, ½ HP. U.S., 1 ph./60
Keller Die Sinking Machines—"E" (2)
Drill, 20" Prentice Upr. Pl. M.D.
Drill, 28" Aurora B.G., belted
Engine Generator Set, 22½ KW. Wghse, 125
V. DC., Gas Engine
Filing Machine, No. 2 Cochrane-Bly. Belted
Furnace, Melt., 42" Swartz, gas fired, blower
Generator, 22½ KW. 125 V. DC.
Grinder & Buffer, ½ HP. 1/60 cy.
Grinder, disc, No. 26 Besley, dbl. opposed, b.d.
Grinder, Disc No. 7½ Gardner, Motors 3/60
Grinder, Internal No. 23 Baxter, 17" spindle
Grinder, Rot. Surface, 8" Heald belted
Hammer, Steam Drop 1000 lb. Chbg., D. F.
cyl. 8" dia. x 42" str.
Hammers, SF., Steam or Air, 1100 and 800
Holst, chain, 3-Ton Superior triple geared
Keysater, No. 3 Mitts & Merrill, belted
Lathe, bench, 8"x30" Ames, collets, thrd. att.
Miller, New No. 4 Burke, for M.D.

Motor, 10HP. C-W. 230 V. DC., 1400 Rev.,
(new)
Pipe Machines, 8" & 2" Landis, M.D. (New
1929).
Planer, Crank 20x20x24 Cinc. 1 Hd., B.D.
Press, Foot, No. 18 Famco, on stand
Punch, S.E., No. 7 L.&A., 4" tht., belted md.
Punches, gang 30" No. 6 Niag.; 48" Bertach,
M. D.
Riveter, 2-A High Speed for M.D.
Saw, Hack, 6x6" Toledo, Motor 1/60
Saw, Hack, 12"x12" Racine Hi-Sp., cab.
base, B.D.
Saw, Hack, 6"x6" Robertson No. 2, Motor
1/60/110 V.
Shaft Straightening Mach., No. 3-A Grier Hard
Shear, Rotary No. 15-A Niag., circling attach.
Thread Miller, Smalley General 12x36", MD.
Threading Mach., Auto. 2" Rickett-Shafer, bor-
ing & Chamfering tools, M.D.
Welder, Butt, Taylor-Winfield, 220 KW., 220 v.
Welders, Arc, 400 Amp., Engine driven (4)
Welders, Butt 200 & 300 KW. Winfield 60
cy., 400 V.

PRESS, Hydraulic, 250-Ton, 4-posts, platen 148"x52", daylight 108", stroke 40", water
pres. 2500 lbs. Wt. 130,000 lbs. Near new (2)

GALBREATH MACHINERY CO.

306 Empire Building - Pittsburgh, Pa.

Good Used Machinery

BORING MILLS—Baush 44" m.d. Bullard 51" Vert., 2 hds.; Rockf. No. 2 hori., 3 1/4" Bar; Colburn 42" Vert. 2 Hds.; Colburn 42" one head; Mach. Tool 3" Horiz.; Bullard 28" 1-Hd. Vert.

BRAKES—Keene 10' 16 ga. Toggle Press; D K 10' 14-ga.

COLD SAWS—Newton 9" cap., Cochrane & Bly Nos. 2-B & 4-B; Higley No. 14

CUT-OFF MACHINE—Davis 6" cap.

DRILLS (RADIAL)—Fosdick 4' Carlton 4' all gear box dr.; Hammond 4' sensitive; Bickford 6' gr. box; Mueller 4 1/2' g. box; Morris 3' Gr. Box; American 5'

DRILLS (H. S. B. B.)—H & W 2, 4, 5sp.; Sipp 1 & 2 sp.; Allen 2; Avey, Demco, Lel-Gif. 1-sp.; Avey 2-sp.; Avey 6-sp.

DRILLS (MISC.)—Defiance Hvy Duty 2" cap.; Hamilton 42" S. H.; Barnes 20" & 24" 1-sp. & 20" 4-sp.; P W No. 12 Multi-Sp.; Natco 20 sp. Rect. head; P. & W. 24 sp. rectangular head Adj.; Barnes 4-Sp. 24" Camelback; Moline 4-Sp. Hole Hog; Colburn 20" S.P.D.

GEAR CUTTERS—B & S 26" s. p. d. automatic spur; Cincinnati 36" gear cutter. B. & S. 48"x10"; G. & E. 48" gear Cutter; Fellows No. 3 Gear Shaper

GRINDERS—P & W 12" vert. surf.; Cin. No. 2 & B. & S. No. 12 univ. tool, B & S No. 16 pl.; B & S No. 2 Surf.; Heald Nos. 60 & 65 Int.; Landis 10x30" Plain; B & S 10x48"; Badger No. 220, auto. d. e., opposed disc (4); Diamond No. 2 Auto. Surf.; Ingersoll Tub Cutter; Cinc. 12x36" pl.; Bath Univ.

HAMMERS—Mayer 50-lb.; W & W 165 lb.; Kane & Roach 70 lb.; Beaudry 150 lb.; Bradley 200 lb. Upright Helve

KEYSEATERS—Mitta & Merrill No. 5 vert. Davis No. 1; M. & M. No. 0; M. & M. No. 2.

LATHES—Monarch 16"x10" M.D.; Lehmann 18"x9"; American 34"x18" Q.C.G. M.D. Hvy.; Davis 22"x10"; L & S 20"x10"; S-B & E 20"x10" q.c.g.; Flather 22"x10"; LeBlond 16"x8"; Gleason 45"x12"; Mon-

arch 16"x8" (2); Ryerson 20x10", m.d.; S.B.E. 30"x12" Q. C. G. Hendey 16"x8"; Sidney 18"x8" and Flather 16"x8"; L. & S. 16"x8" M.D.; S. Bend 16"x8" Maine 26"x14" Q.C.G.

MILLING MACHINES—Ohio No. 20, B & S No. 3, LeBlond No. 3H, Cin. No. 1 s.p.d. Plain; Owen Duplex; Ingersoll M.D. Slab Miller 4 hds.; Newton Vert. with rotary table; Ohio No. 24 Plain; B & S No. 12 Mtg. Type; Becker No. 5 Plain; Bilton No. 25; Ingersoll 2-sp. vertical; Cinc. No. 2 Pl.; Cinc. No. 3 Pl.; Becker No. 25 Pl.

THREAD MILLERS—Smalley General No. 23-A; Moline No. 10

PLANERS—Pond 32"x34"x10"; Pease 26"x 26"x9"; Cincinnati 36"x36"x10" 2 Hds.; Gray 24x24"x6"; Cinc. 24x24x6"

PIPE MACH.—Williams 6" cap.; Oster 6"

PROFILER—Reed Prentice Two Sp.

PUNCH PRESSES — Ferracute No. P-4; Barouth No. 3 & No. 4 O.B.I.; Bliss No. 62; Toledo No. 31 & No. 32; Fer. No. EGF 52 Coining; Swaine No. 38 arch; Cons. No. 24 Blanking; Bliss No. 21; Niagara No. 4 O.B.I.

SAWS (HACK)—Atkins 8x8"; Racine 6x6"

SHAPERS—S & M, G & E, Ohio, Mi. Q. City, Davis, Ohio & G & E 20"; S & M, Q. City, Rock., Cin. 24"; Ohio 26"; Cin. 24" s. p. gr. box; American 24" heavy, b.g. Amer. 15"; S & M. 26", b.g. G. & E. 24", s.p., gearbox; Amer. 20"; Rockf. 24" gearbox; Stockbridge 26"; Am. 16"

SCREW MACHINES—8 Hand; B & O No. 3; Foster No. 3

SQUARE SHEAR—D & K 36" 14-ga. steel
SLOTTER—Barr 12"; Betts 6" stroke; Niles 12"

TAPPING MACHINES—(2) Garvin No. 2 & 2X Vertical Automatic & Garvin No. 1.

TURRET LATHES—Potter & Johnston, 8 1/2 x 16 No. 10; P. & W. 2 1/4" hole grd. hd.; Greenlee 2 1/4 x 26; Brown & Sharpe No. 4; Gisholt 26"; Colburn 30" Vert.; B & S Vert. 38"

Above is only a small part of our large stock on hand

McDonald

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1531-35 N. Broadway ST. LOUIS, MO.

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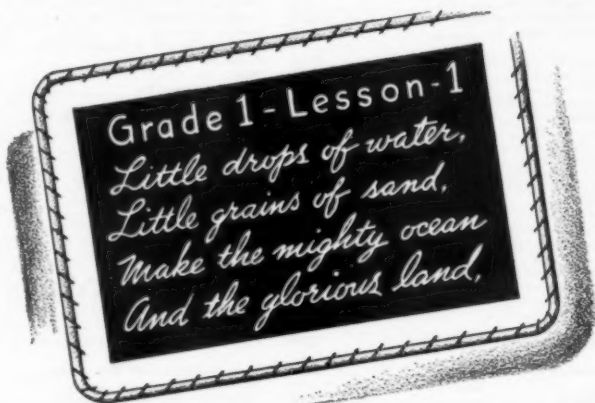
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"EASY STEPS FOR LITTLE FEET"



TODAY'S LESSON TO INDUSTRY

*Little drops of emery,
Little grains of sand,
Help to slow Production
When they get out of hand.*

TRAP GRINDER AND BUFFER
DUST WITH THE AIR MASTER!
A size to fit every wheel. Easy
to install, easy to clean. Write
today for descriptive literature.



The Cincinnati

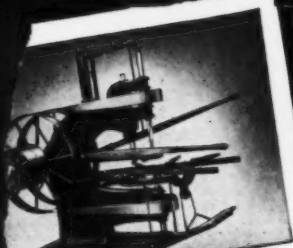
ELECTRIC DRILLS • GRINDERS • BUFFERS • PORTABLE TOOLS

The Cincinnati Electrical Tool Co.

DIVISION OF THE R. K. LE BLOND MACHINE TOOL CO., CINCINNATI, OHIO

2702-4
MADISON RD.

IRS AND MAKERS OF INDUSTRIAL MACHINERY SINCE 1875



Back in Horse 'n' Buggy Days THE HUB-BORER

An important machine-tool in its day, this Lipe-created HUB-BORER was a step toward mechanization of industry. It preceded the automobile, a development in which Lipe inventive resource also played a valuable part.

Now, for today's mechanized-war era, the

CARBO-MATIC LATHE

*for faster precision turning of
tough armament alloys...*



smoother, more powerful cut. The base is as rigid as a rock. Even the strains of "Hogging off" tough armament steels cause no distortion, no chatter or tool breakage... no out-of-round, out-of-true or other work spoilage.

War or no war, the higher cutting speeds of the carbide tool were bound to come — everybody knew that. But Lipe engineers also saw that a more powerful lathe of greater rigidity would be needed to handle the heavier cuts and higher speeds which any improvement in cutting tools would bring.

That's why the LIPE Carbo-Matic Lathe was designed. It has a cone worm-gear and multiple V-belt drive for a far

In a single operation, it turns to ordinary rough-grinding tolerances. And it is fast on multiple-operation cycles, because it is fully automatic. The operator merely loads and unloads the work. Hydraulic power operates the holding equipment, longitudinal and cross feeds and tail-stock quill. Swing over carriage 8", between centers 30". Factory facilities expanded to meet the demand; write for delivery dates.



CULLMAN



CULLMAN Individual Drives make your machine tools independent of line shafting, giving complete flexibility of location and operation, improved efficiency, lower production costs, save floor space, and increase safety.

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